

Federal Republic of Nigeria

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Data Collection Survey on Agriculture
Sector in Nigeria (QCBS)**

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Acronyms

Acronym	Word
ABEDA	Arab Bank for Economic Development in Africa
ABM	Department of Agribusiness and Market Development
ABP	Anchor Borrowers' Programme
AC	Aggregation Center
ACDI	Agricultural Commodity Development Initiative
ACES	Alternative Credit Evaluation System
ACGS	Agricultural Credit Guarantee Scheme
ADP	Agricultural Development Programme
AFAN	All Farmers Association of Nigeria
AFD	Agence Française de Développement
AfDB	African Development Bank
AFICAT	Africa Field Innovation Center for Agricultural Technology
AgFin	Promotion of agricultural finance for agri-based enterprises in rural areas
AGSMEIS	Agri-Business/Small and Medium Enterprises Investment Scheme
AIH	Agro-Industrial Hub
AMCON	Asset Management Corporation of Nigeria
AMMOTRAC	Agricultural Mechanics and Machinery Operators Training Center
AOS	Agricultural Operating System
APP	Agriculture Promotion Policy
APS	National Report of Wet Season Agricultural Performance in Nigeria
ATA	Agriculture Transformation Agenda
ATASP	Agriculture Transformation Agenda Support Programme
ATC	Agricultural Transformation Center
BMA	Business Model Analysis
BOA	Bank of Agriculture
BRD	Bureau of Rural Development
BS	Breeder Seed
BVN	Bank Verification Number
CAC	Corporate Affairs Commission
CACS	Commercial Agriculture Credit Scheme
CAF	Commodity Alliance Forum
CAR	Capital Adequacy Ratio
CARD	Coalition for African Rice Development
CBN	Central Bank of Nigeria
CFAN	National Cooperative Financing Agency of Nigeria
CIBN	The Chartered Institute of Bankers of Nigeria
CITA	Companies Income Tax Act
CRIN	Cocoa Research Institute of Nigeria
CRMS	Credit Risk Management System
CS	Certified Seed
CTA	Technical Centre for Agricultural and Rural Cooperation
DBN	Development Bank of Nigeria
DDRO	Department of Dams and Reservoir Operations
DFIs	Development Finance Institutions
DID	Department of Irrigation and Drainage
DMBs	Deposit Money Banks
DSCR	Debt Service Coverage Ratio
DPL	Development Policy Loan
DX	Digital Transformation
EAS	Extension and Advisory Services
ERGP	Economic Recovery and Growth Plan
FAAC	Federation Account Allocation Committee
FAO	Food and Agriculture Organization of the United Nations

FBS	Farmer Business School
FCMB	First City Monument Bank
FCT	Federal Capital Territory
FDA	Federal Department of Agriculture
FDAE	Federal Department of Agricultural Extension
FDC	Federal Department of Cooperatives
FDRD	Federal Department of Rural Development
FEPSAN	Fertilizers Producers and Suppliers Association of Nigeria
FERMA	Federal Road Maintenance Agency
FFS	Farmer Field School
FMAFS	Federal Ministry of Agriculture and Food Security
FMARD	Federal Ministry of Agriculture and Rural Development
FMCT	Federal Ministry of Communications Technology
FMITI	Federal Ministry of Industry, Trade and Investment
FMN	Flour Mills of Nigeria
FMWH	Federal Ministry of Works and Housing
FMWR	Federal Ministry of Water Resources
FS	Foundation Seed
GALS	Gender Action Learning System
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GEEP	Government Enterprise & Empowerment Programme
GESS	Growth Enhancement Support Scheme
GIAE	Green Innovation Centres for Agriculture and Food Sector Programme
GIP	The Green Imperative Programme
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GNI	Gross National Income
HA	Hydrological Area
IBA	Important Bird Area
ICT	Information and Communication Technology
IDITRA	Industrial Development (Income Tax Relief) Act
IDP	Interest Drawback Programme
IFAD	International Fund for Agricultural Development
IITA	International Institute of Tropical Agriculture
IMF	International Monetary Fund
IPPA	Investment Promotion & Protection Agreement
IPPC	International Plant Protection Convention
IsDB	Islamic Development Bank
ISO	International Organization for Standardization
JA	Japan Agricultural Cooperatives
ITU	International Telecommunication Union
JICA	Japan International Cooperation Agency
KSSDP	Kwara State Sustainable Development Plan
KWASIP	Kwara Social Investment Programme
LBAs	Licensed Buying Agents
LDR	Loans to deposit ratio
LGA	Local Government Authority
LIFE ND	Livelihood Improvement Family Enterprises Project in the Niger Delta of Nigeria
LNRBDA	Lower Niger River Development Authority
MFBs	Microfinance Banks
MFI	Micro Finance Institutions
MLR	Maximum Lending Rate
MOU	Memorandum Of Understanding
MSME	Micro, Small and Medium Enterprises
MSMEDF	Micro, Small and Medium Enterprises Development Fund

NACCIMA	Nigerian Association of Chambers of Commerce, Industry, Mines, and Agriculture
NACMO	National Agricultural Cooperative Marketing Organization
NACO	National Agricultural Cooperative Organization
NAERLS	National Agricultural Extension and Research Liaison Services
NAFDAC	National Agency for Food and Drug Administration and Control
NAIC	Nigerian Agricultural Insurance Corporation
NAICOM	National Insurance Commission
NALDA	National Agricultural Land Development Authority
NAMB	National Association of Microfinance Banks
NANFACOS	National Apex of Nigeria Farmers' Cooperative Society Limited
NAPI	Nigeria Agriculture Payment Initiative
NAQS	Nigeria Agricultural Quarantine Service
NARIS	National Agricultural Research Institutes
NASC	National Agriculture Seed Council
NASS	National Agriculture Sample Survey
NATIP	National Agricultural Technology and Innovation Policy
NAVSA	The National Adopted Village for Smart Agriculture
NCAM	National Center for Agricultural Mechanization
NCR	National Collateral Registry
NCRI	National Cereal Research Institute
NCS	Nigeria Customs Service
NDP	National Development Plan
NEDS	Nasarawa Economic Development Strategy
NEPC	Nigerian Export Promotion Council
NESREA	The National Environmental Standards and Regulations Enforcement Agency
NFHC	National Farmer Helpline Center
NGX	Nigerian Exchange
NIA	Nigerian Insurers Association
NIBOR	Nigeria Inter-Bank Offer Rate
NIPC	Nigerian Investment Promotion Commission
NIRSAL	Nigeria Incentive-based Risk-sharing System for Agricultural Lending
NIS	Nigeria Industrial Standard
NISER	Nigerian Institute of Social and Economic Research
NITDA	the National Information Technology Development Agency
NPA	Nigerian Ports Authority
NPL	Non-performing loan
NRCR	National Root Crop Research Institute
NSIA	Nigeria Sovereign Investment Authority
OECD	Organization for Economic Cooperation and Development
OGFIMS	Ogun State Farmer Information Management System
OGSTEP	Ogun State Economic Transformation Project
P&PC	Department of Planning and Policy Coordination
PCBs	Private Credit Bureaus
PFI	Participating Financial Institutions
PFI	Presidential Fertilizer Initiative
PIM	Participatory Irrigation Management
PITA	Personal Income Tax Act
PLR	Prime Lending Rate
PMT	Project Management Team
QCA	Quality Competent Authorities
RAAMP	Rural Access and Agricultural Marketing Project
RAMP	Rural Access and Mobility Project
RAI	Rural Access Index
RBDA	River Basin Development Authority
REFILS	Research-Extension-Farmer-Input Linkage System

SAPZs	Special Agro-Industrial Processing Zones
SEC	Securities and Exchange Commission
SHEP	Smallholder Horticulture Empowerment & Promotion
SLA	Services Level Agreement
SME	Small and Medium-sized Enterprises
SMEDAN	Small and Medium Enterprises Development Agency of Nigeria
SON	Standard Organization of Nigeria
SONCAP	SON Conformity Assessment Programme
SPIN	Sustainable Power and Irrigation in Nigeria
SPS	Sanitary and Phytosanitary Measures
SRRBDA	Sokoto-Rima River Basin Development Authority
SU	Start-Up Companies
TOHFAN	Tractor Owners and Hiring Facilities Association of Nigeria
ToT	Training of Trainers
TRIMING	Transforming Irrigation Management in Nigeria
TSL	Two Step Loan
USAID	US Agency for International Development
VC	Value Chain
VC	Venture Capital
VCDP	Value Chain Development Programme
WB	World Bank
WC	Working Capital
WFP	World Food Programme
WUA	Water User Association
WUG	Water User Group

1 Summary of the Survey

1.1 Background

The Federal Republic of Nigeria (hereinafter referred to as Nigeria) has the largest population and GDP in the African region, and its huge potential market attracts a great deal of interest from foreign companies for investment. The agricultural sector accounts for 24% of GDP and is one of the major industries in which about 34% of the working population is engaged, and about 90% of agricultural production are produced by small-scale farmers who make up the majority of rural residents (approximately 100 million people). Approximately 77% of the country's land area (about 71 million ha) is suitable for cultivation, having fertile soil and abundant water resources, therefore the sector has great potential and being an important sector in the nation's development policy.

In December 2021, the Nigerian government formulated the National Development Plan (NDP) (2021-2025), a medium-term national development plan that aims to “Unlock its potentials in all sectors of the economy for a sustainable, holistic and inclusive national development”, and increasing agricultural production for promoting economic growth and meeting domestic food demand by 2025. In line with the NDP, FMAFS has formulated the National Agricultural Technology and Innovation Policy (NATIP) (2022-2027), which aims to further promote the industry by improving productivity, production amount and quality in the agricultural sector through the improvement of agricultural infrastructure and financial access. In terms of industrial development, FMAFS is also promoting agribusiness with large companies (such as Olam) and agricultural start-up companies.

JICA has contributed to increasing the incomes of small-scale farmers through the promoting of the SHEP approach and improved parboiling technology (IPT). On the other hand, farmlands, especially those of small-scale farmers, are often small and not leveled, and agricultural infrastructure such as irrigation facilities are not well developed. In addition, although about 100,000 tractors and machineries are needed to work at the optimum time, only about 7,000 tractors are said to be in operation at present. In addition, private financial institutes provide only 3.8% of all loans to the agricultural sector, and it is difficult for agribusiness operators to obtain financing¹. Especially, although the Bank of Agriculture (BOA) exists as a public financial institution, its financial services to small farmers are limited. Hence investment in agricultural equipment and infrastructures are not well promoted.

As described above, in addition to agricultural knowledge and technology supported by existing projects, low quality of agricultural infrastructure and financial services are main factors to hinder agricultural productivity.

Therefore, this study examined the cooperation policies needed for the Nigerian agricultural sector in the future in order to improve agricultural productivity and income of small farmers. In addition, more detailed research and analysis was conducted, especially in agricultural finance and infrastructure.

¹ Evaluating Agriculture Finance in Nigeria: Towards the US\$1 trillion African food market by 2030 (PwC)

1.2 Purpose

This study collected and confirmed basic information in the agricultural sector in Nigeria to promote the improvement of agricultural productivity and income of small-scale farmers, and examined and propose a list of specific projects (technical cooperation, grant aid, ODA loans (project loans, two step loans (TSL), development policy loans (DPL), private sector investment finance, etc.). The objective is to make some project proposal through more detailed research and analysis on (1) agricultural finance and (2) agricultural infrastructure.

1.3 Scope and Method

In order to collect and confirm basic information on the agricultural sector in Nigeria, and to review and propose a list of potential projects, reviewing documents and statistical data analysis, online and face-to-face interviews with relevant institutions, rural surveys, and field visits were conducted throughout the country including 36 states and the Federal Capital Territory (FCT).

1.4 Survey Team

The composition of the survey team is as follows. In addition, two Nigerian persons were assigned to follow up the team to gather information and contact with relevant organizations in Nigeria.

Table 1-1 Composition of the team

In charge	Name	Company
Team leader, Agricultural policy 1, Agricultural finance 1, Small and medium enterprise analysis	Manabu Tsurutani	NTC International Co., Ltd.
Sub team leader, Agricultural policy 2, Agricultural finance 2, Agricultural Cooperative	Makoto Hoshi	NTC International Co., Ltd.
Agricultural infrastructure	Tsuneo Kuwahara	NTC International Co., Ltd.
Digital technology	Masahiko Natori	NTC International Co., Ltd.
Agricultural distribution	Takuma Koura	Nippon Koei Co., Ltd.
Social environment	Hisako Sumi	NTC International Co., Ltd.
Agricultural analysis, Coordinator	Hiromi Aiko	NTC International Co., Ltd.

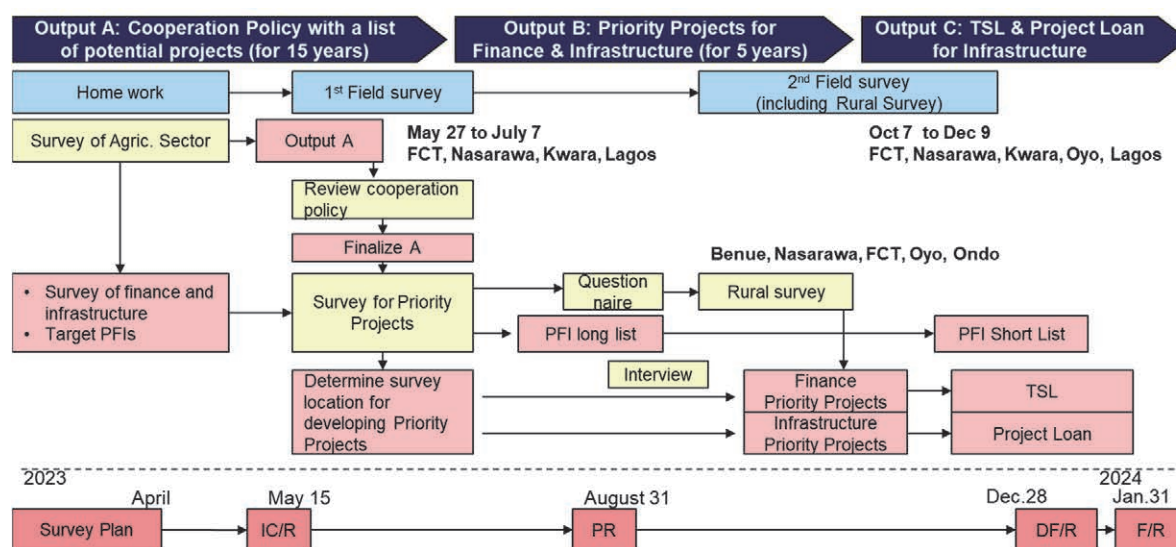
1.5 Schedule and Main Interviewee

The study was conducted from April to December 2023, as shown in the chart below, with the aim of three major outputs: A) Cooperation policy with a list of potential projects (for 15 years), B) Priority projects for finance and infrastructure (for 5 years), C) TSL and project loan for agricultural infrastructure.

Before the first field survey, various document reviews and statistical data analysis were conducted in Japan. During the field surveys (1st survey: May 27 to July 7, 2023, 2nd survey: October 7 to December 9, 2023), online and face-to-face interviews were set up with the various organizations as described below. Between the first and second field surveys, along with document reviews, statistical data analysis and online interviews, questionnaires for commercial banks and microfinance institutions

were developed and distributed to confirm the current status and funding needs of each financial institution.

In October 2023, a rural survey was conducted in 5 states (Benue, Nasarawa, FCT, Oyo, and Ondo) to confirm the current situation of local farmers and their financial demands. In addition, field visits to potential irrigation project sites were conducted in Nasarawa and Kwara states to confirm the real situations.



Source: Survey team

Figure 1-1 Schedule of the survey

Below is a list of main interviewees (online or face-to-face).

Table 1-2 Main interviewees of the survey

Type		Interviewees
Federal government		FMWR, FMAFS(FDRD, ABM, FDA, FDAE, FDC, NAERLS, P&PC), NASC, NITDA, NAQS, NEPC, NIPC, Federal Ministry of Finance, Federal Ministry of Transportation, NPA
State government	FCT	Agriculture and Rural Development Secretariat, Transport Secretariat
	Nasarawa state	Ministry of Agriculture and Water Resources, Ministry of Works Housing and Transport, Bureau for Rural Development, Ministry of Commerce Industry and Cooperatives, Nasarawa Agricultural Development Programme, Ministry of Environment and Natural Resources
	Kwara state	Ministry of Agriculture and Natural Resources, Kwara Agricultural Development Programme, Ministry of Works and Transportation, Lower Nigeria River Basin Development Authority, Ministry of Environment and Natural Resources
	Oyo state	Ministry of Trade, Industry and Cooperatives
International donors/organizations		AfDB, IFAD, IFAD-VCDP, GIZ, WB, FAO, AFD, IMF, Proparco
Companies and Start-up companies		AFEX, Alluvial Agriculture, Hello Tractor, ThriveAgric, Babban Gona, STANDAGE, ZOWASEL, Mitsubishi Corporation, Farm2U, TradeBuza, Unique Venture Capital Management Company Limited, Growth Capital, Cellulant, Riby, Olam Food Ingredients Nigeria, Vertex Agro
Commercial banks, microfinance institutes		First Bank Plc, Polaris Bank Plc, Sterling Bank, Union Bank of Nigeria Plc, Stanbic IBTC Bank Plc, Unity Bank Plc, First City Monument Bank, Ecobank

Type	Interviewees
	Nigeria Plc, Zenith Bank, Nasarawa Microfinance Bank, Wema Bank, United Bank for Africa Plc, Providus Bank, VFD Microfinance Bank
Financial institute	CBN, BOA, NAIC, NIRSAL, BOI, Pula Advisory
Farmers and farmers group	Target farmers and cooperatives of the rural survey (FCT, Nasarawa, Oyo), Other farmers and cooperatives (Nasarawa)
Cooperative APEX organizations	CFAN, NACO, Fisheries Cooperative Federation of Nigeria, NACMO, NANFACOS, NACCIMA, NAMB
Others	Lafia Vegetable Market (Nasarawa), Mile 12 International Market (Lagos), Oyingbo Market (Lagos), Agricultural input dealers

Source: Survey team

1.6 Summary of the Survey Result

1.6.1 Background and objective of the survey

The agriculture sector in Nigeria is the most important sector, accounting for 24% of GDP and 34% of the working population. With about 77% (about 71 million hectares) of the country's land area suitable for cultivation, fertile soil, and abundant water resources, the country has the potential to expand agricultural production and employment.

However, the agricultural sector faces various challenges and fails to fully utilize its potential. The challenges include inadequate access to good quality seeds and farming methods, lack of access to mechanization services, inefficiency of distribution in rural areas, quality deterioration due to primary processing in small factories, lack of investment due to difficulties in financial access, and distribution problems from the production area to the consumption area. In response, the federal government has improved the agricultural sector through The Economic Recovery and Growth Plan (ERGP 2017-20), The Agriculture Promotion Policy (APP) 2016-2020, and the Presidential Initiative on Fertilizer. As a result, since 2016, the yield of crops such as sesame and maize has improved, and exports of sesame, cacao, ginger, etc. have increased.

Nonetheless, low agricultural productivity still remains a major issue, and when comparing the main crops with neighboring countries, 7 out of 10 main grains are inferior, and the productivity of vegetables such as tomatoes is generally low. The Federal Government develops and implements policies to further improve the challenges faced by the agricultural sector. The medium-term national development plan "National Development Plan (NDP) (2021-2025)" sets goals for the agricultural sector to increase agricultural productivity and meet domestic demand for food. It presents strategies and policy measures as well as 7 key performance indicators (KPIs). In accordance with NDP, the Federal Ministry of Agriculture and Rural Development (FMARD) has formulated the "National Agricultural Technology and Innovation Policy (NATIP) (2022-2027)" to improve agricultural infrastructure and access to finance, aiming for further industrial development, such as improving productivity, production volume and quality in the agricultural sector.

In response to those status, this survey examines and proposes future cooperation policies and development policy loans, including specific project lists, in the direction of promoting the improvement of agricultural productivity and income of small-scale farmers and thereby benefiting the goals of the NDP. This survey conducted a literature review and two field surveys from April to December 2023,

and focused on A) creating a list of cooperation policies and potential projects over a 15-year period, and B) developing priority projects in agricultural finance and agricultural infrastructure over a 5-year period, and C) proposing Two-Step Loan (TSL) project and project loan projects in agricultural infrastructure.

1.6.2 Agricultural production

Nigeria has a land area being 910,770 square kilometers, of which about 77% (about 71 million hectares) is said to be cultivable land. In 2021, yam (59.88 million tons), cassava (58.24 million tons), maize (12.75 million tons) and rice (8.34 million tons) are mainly produced. Yam and cassava, in particular, being positioned in the world's largest production. The total population is over 213 million, of which more than 70% are said to be engaged in agriculture-related industry. There are approximately 18.17 million crop farmers, 12.30 million livestock farmers, 6.39 million poultry farmers, and 1.02 million fishery farmers.

In terms of farmland ownership, 84% of farmland is cultivated based on owner-like possession (including the farmland cultivated by farmers who were given the farmland from their ancestors for some generations), 11% is farmland leased from family or relatives, 4% of farmland is leased from third party or the cultivator pays royalties, and 1% is farmland that is illegally cultivated. According to Nigeria's Land Use Act (1978), land in urban areas is mainly owned by state governments, while land in rural areas can be owned by local governments. State government and local government can grant the right to occupy land to farmers, and farmers who have been continued farming in the area for the generations can carry out farming by applying to the government and the right can be a collateral. On the other hand, acquisition of the right is not being proceeded well because of unawareness of the application and its burden of procedure. As a result, obtaining loans from financial institutions with farmland right as collateral is not being progressed well either.

Agricultural extension is conducted by the government, the private sector, and aid agencies. Agricultural Development Programme (ADP) is a nationwide programme managed by each state government and FDAE, but due to a lack of budget and human resources, necessary training has not been adequately provided to farmers. As for the agricultural R&D, national research institutes conduct researches on breeding and farming techniques, but due to a lack of facilities and equipment, and inadequate organizational and staff capacity, agricultural R&D including seed production is not being properly implemented and managed.

The tractor utilization rate in Nigeria is said to be less than 10%, and many small and medium-sized smallholder farmers still use human and animal power to do their work. The lack of tractors has led to delays in farm work, resulting in low yields. The training of tractor operators and mechanics, and the securing of spare parts are main challenges that need to be addressed in order to promote agricultural machineries.

Although there are several governmental agricultural subsidy and loan programs to support farmers, they are often not provided in adequate amount and time because the government does not have a timely grasp of farmers' situations and demands. In addition, although human resource development is being

conducted at agricultural technical schools and agricultural departments in universities, it has been pointed out that the current situation in the agricultural sector is not reflected in the curriculum, resulting that it is difficult for graduates to work immediately after graduation.

1.6.3 Current status and challenges of farmers' group

Cooperative system in Nigeria consists of a four-tier structure of Unit cooperative, Union, State APEX, and Federal APEX, with only 44% and 25% of ratio of organization in the agricultural and aquaculture sectors, respectively. In addition, in the case of cooperatives at the state level, all of the unit cooperatives produce several products, as well as process crops and buy crops from other unit cooperatives, in order to diversify risk and their business. These unit cooperatives are facing challenges in the areas of production, sales, finance, etc., and lack loans from banks and support from higher level organizations, state governments, agricultural enterprises, and startups. Against this backdrop, organizing farmers have not been well proceeded due to 1) a mindset of lack of trust, 2) a weak system of cooperative, and 3) problems with the APEX system. The directions for improvement or cooperation include 1) Support for farmers by startups and 2) support for cooperatives through agricultural digital platforms structured by Federal government.

1.6.4 Agriculture Distribution

In Nigeria, various stakeholders (farmers, traders, cooperatives, supply-side wholesalers, demand-side wholesalers, and retailers) are involved in the distribution process.

For the storage of agricultural products in rural areas, most small-scale farmers keep their products in traditional and improvised structures without maintaining moisture content and controlling pests. For transportation, the average distance from their farm to the nearest motorable road is long, which makes it difficult for them to participate in markets without relying on traders.

Transportation from rural areas to consumption areas is mainly done in open, non-refrigerated trucks. Due to the low quality of roads and limited road surface ratio, transportation takes a considerable amount of time. Regulations by some states restricting truck traffic entering city centers during the day to avoid traffic jams and accidents have also extended transportation times. The longer transportation time in Nigeria has led to higher transportation costs, with distribution expenses accounting for as much as 40% of wholesale prices.

Post-harvest losses in Nigeria are significant, particularly for perishable crops such as fruits and vegetables. These losses are estimated to reach 50% of the total production value annually, exceeding the average for sub-Saharan Africa (20% to 40%). The factors contributing to the elevated post-harvest loss rate are the utilization of traditional baskets for transportation and limited access to cooling fans, refrigeration, and other cooling technologies.

Despite the initiatives to streamline export procedures by digitizing export/import control systems, exporters continue to encounter substantial time and financial expenses during these processes, and Nigeria's duration and cost of customs, quarantine, and shipping procedures are more extended than the Sub-Saharan African average. Nigeria's primary export products are well-regarded in international

markets for their quality. However, due to substantial processing costs, these products are not processed domestically but exported as raw materials to various countries. Farmers' insufficient knowledge of proper pesticide application has also increased pesticide residues in final products, which have been rejected in destination countries.

Under the current situation, from the viewpoint of agricultural distribution, it is essential to reduce distribution costs to enhance the value chain. The primary challenges in reducing the costs can be summarized as i) mitigation of post-harvest losses and ii) reduction of transportation costs and export processing costs. In order to address the challenges of mitigating post-harvest losses, it is essential to promote proper storage of agricultural products, develop a supply system based on demand, and develop an efficient distribution system. In order to reduce transportation costs and export processing costs, it is necessary to establish efficient export processes in addition to developing an efficient distribution system.

1.6.5 Agricultural finance

The scale of agricultural finance in Nigeria is 3.5% of the agricultural sector's GDP, which is small compared to the agricultural sector's share of GDP, which is 23.7%. Agricultural loans account for 6.0% of banks' credit to the private sector, but the NDP has set a KPI of increasing this to 10%.

Agricultural loans are mainly provided by private banks such as commercial banks and microfinance banks (MFBs), as well as the Development Financial Institutions (DFIs) funded by the government such as CBN and Federal Ministry of Finance. Among DFIs, institutions involved in agriculture-related financing (including farmers and other producers as well as agriculture-related businesses and companies such as suppliers and processors) include the Bank of Agriculture (BOA), the Bank of Industry (BOI), and Development Bank of Nigeria (DBN). In addition, credit cooperatives also provide loans to their member farmers and micro, small and medium-sized enterprises (MSMEs) involved in agriculture related business.

Market interest rates are high in Nigeria, and as of June 2023, the policy rate is 18.5%, the preferential lending rate is 13.85%, and the highest lending rate is 28.94% (as published by CBN). MFB's lending interest rate is around 2.5%-5.0% per month. The reason for high interest rates is that the size of the money supply is small due to the macroeconomic situation. For this reason, the loan period also does not meet the needs of agricultural stakeholders, generally one to two years. Therefore, the CBN, BOI, and DBN are implementing on lending programs (a similar mechanism to TSL), which provides financial resources to banks and other institutions at low interest rates. In this case, the CBN lends to participating banks (PFI) at 2%, and PFI lends to the borrowers at 9%. Large-scale on-lending programs for agriculture include the Anchor Borrowers' Program (ABP) and the Commercial Agriculture Credit Scheme (CACS). As for other support measures, the Agricultural Credit Guarantee Scheme Fund (ACGSF) is mainly used by farmers. ACGSF primarily operates through the Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL), which is funded by the CBN. Additionally, the Nigerian Agricultural Insurance Corporation (NAIC) provides subsidized agricultural insurance.

As for the challenges, it surfaced as a side effect of ABP's policy to increase its lending performance,

especially among the on-lending program loans. Especially in the early stages of ABP, individual farmers were often the direct debtors, which caused low repayment ratio due to lack of financial literacy among farmers, insufficient monitoring of banks and anchor companies² that had contracted to purchase from farmers, and loan instruments which failed to disburse loans on time of planting. Those issues should be considered as a lesson to design the agricultural finance including TSL project. In addition, BOA, which is originally the main institution supporting agricultural finance, is currently shrinking its business due to financial issues, and reform, including capital increase, is an urgent issue.

1.6.6 Agricultural infrastructure

A wide range of agricultural infrastructure from upstream to downstream of VC (1. Infrastructure related to production base, 2. Infrastructure related to post-harvest, 3. Infrastructure related to distribution, 4. Infrastructure related to collection and sales, 5. Infrastructure related to research, extension, and training) were reviewed. Regarding infrastructure related to production bases, although it is not easy to expand farmland, there is great potential and room for irrigation development. Regarding post-harvest-related infrastructure, it has been pointed out that storage facilities lack storage capacity. As for processing facilities, although a large market is expected, there is a lack of knowledge, contract producers, and funding. Regarding distribution-related infrastructure, roads account for 90% of distribution. Main roads are in relatively good condition, but most state and local roads are in poor condition and need improvement. The railways are in the process of being revived, and although the capacity of the ports is low by international standards, new ports have opened and improvements are being made in terms of operations. Regarding collection and sales infrastructure, various donor projects are underway with the aim of strengthening VC linkages. Regarding infrastructure related to research, extension, and training, there is a need to improve the deterioration of infrastructure and strengthen funding.

As described above, it has been pointed out that all infrastructure facilities are lacking, and expansion is required. Among these, important issues are the expansion of irrigation facilities to increase agricultural productivity and the improvement of local roads, which have a large negative impact on distribution costs and post-harvest losses. Furthermore, based on the concept of VC development in recent years, there has been an increase in the number of businesses that support the flow of production, processing, and distribution as a set.

1.6.7 Issues of agricultural sector in Nigeria

Challenges in Nigeria's agricultural sector are clearly reflected in the Food Security Index. According to the 2022 index, Nigeria ranks 107th out of 113 countries worldwide, and ranks low among sub-Saharan countries at 25th out of 28 countries. In particular, rising food prices, agricultural supply capacity, and productivity issues are factors contributing to the low score.

² The ABP Guidelines of the CBN state that "reputable companies (anchors) involved in the production and processing of key agricultural commodities". In general, this term often refers to companies that purchase products from farmers (groups) based on certain contracts and provide the necessary support to farmers to ensure proper shipments.

On the other hand, this study investigated the value chain (VC) from upstream to downstream and import/export for 31 major items (selected from grains, vegetables, crops for processing/export, livestock/poultry farming, and aquaculture). As a result, the inefficiency of VC by stage is identified. Unit yield in the production stage and waste ratio in post-harvest, storage, and rural distribution stage are inferior to neighboring countries for some major crop items. This is thought to be affecting the productivity of agricultural VC as a whole. In addition, transportation costs for distribution from production area to consumption markets and export ports are higher than those in neighboring countries. These factors are wide-ranging, but the fundamental issues in the private sector include farmers' access to finance, access to commercial value chain, the rate of participation in cooperatives, and the level of cooperative activity. In the public sector, issues include budget shortages and coordination/cooperation issues for physical agricultural infrastructure, roads, extension services, research and development, etc.

1.6.8 Agricultural policy of Nigeria government

Recent policies in Nigeria include The Economic Recovery and Growth Plan (ERGP), which runs from 2017-2020, and aims to increase agricultural productivity, improve market access, and promote irrigation. Next, The Agriculture Promotion Policy (APP) was implemented for the period 2016-2020. The policy aimed to achieve domestic self-sufficiency by eliminating dependence on food imports and to build agribusiness by creating sustainable income/employment opportunities based on export opportunities. In addition to the above, the Presidential Initiative on Fertilizer was developed to promote the use of fertilizers and it aimed to utilize the private sector to produce and distribute fertilizers in the country, thereby reducing the price of fertilizers and making them available to farmers at lower prices.

The National Development Plan (NDP) is the policy being implemented for the period 2021-2025. The NDP recognized that the growth rate of the agricultural sector was slowing down due to challenges in the quality of agricultural inputs, use of technology to improve efficiency, farming practices, linkages to manufacturing and exports, and lack of budget allocation for the sector. Against this backdrop, the KPIs for achieving these goals have been established: 1) reduce the post-harvest loss ratio, 2) increase the area under cultivation, 3) increase the ratio of agriculture-related exports, 4) increase the participation rate of women in agriculture, 5) increase the food security ranking, 6) increase the ratio of credit to agriculture-related credit (overall credit to the private sector), and 7) reduce the ratio of food-related imports.

In addition, The Federal Ministry of Agriculture and Food Security (FMAFS) has formulated the National Agricultural Technology and Innovation Policy (NATIP, 2022-2027), which sets out 10 priority policies aimed at improving productivity, production volume, and quality in the agricultural sector by improving agricultural infrastructure and access to finance.

A new president was inaugurated in May 2023 and announced the Renewed Hope Agenda with eight priorities. Out of them, four priorities are related to the agricultural sector: 1) food security, 2) economic growth and job creation, 3) poverty eradication, 4) inclusivity (Youths and Women) and enabling environment for individuals, groups, and the private sector to participate in governance and economic activities. In addition, actions with these priorities are listed as immediate priority actions (ongoing to

the end of 2023), Short term priority actions (2023-2024), Medium term actions (2024-2026), and long term actions (2024-2027).

1.6.9 Trends and cooperation analysis of other aid agencies and the possibility of collaboration with JICA projects

Combined with all supports of Major Aid agencies (International Organization: World Bank, African Development Bank, FAO, IFAD and Bilateral Aid: USAID, GIZ, AFD) in Nigeria's agricultural sector are addressing all issues related to five crops (cereals, vegetables, processing crops, livestock, and aquaculture (fisheries)) as well as issues related to agricultural production base, distribution base, and private investment.

Regarding the possibility of collaboration with JICA projects, participation in SAPZ I and SAPZ II, in which AfDB is the leading donor, is considered to be a priority for co-financing. However, it is necessary to devise ways to draw attention to JICA's contribution. Other possibilities include co-financing with SPIN for irrigation facility development and RAAMP for rural road development and agricultural product distribution center construction. Regarding other programs/projects, considering the contents and implementation period, it is considered realistic to not participate in the programs/projects, but to collaborate as side support to create synergistic effects. All of them can utilize JICA's knowledge, experience, and technology, such as agricultural infrastructure projects, water user association strengthening, DX, community development, agribusiness, and SHEP.

1.6.10 Digital Technology Applications and Startups in Agricultural Value Chain

In Nigeria, the National Information and Telecommunications Development Agency (NITDA) has taken the lead in developing an application called NAVSA and promoting the development of digital human resources under the Digital Agriculture Strategy, based on the recognition that the use of digital technology is essential for improving agricultural productivity. However, the federal government's efforts are still in the early stages, and private companies, mainly start-ups, are working on the digitization of the value chain, and their achievements are increasing.

These private sector digitalization efforts often involve core organizer companies that use local agents to organize and empower farmers, and then collaborate with specialized institutions such as seed, fertilizer, and other material manufacturers, food manufacturers and other off-takers, and financial institutions to provide the services necessary for production. In many cases, these organizer companies are playing a role similar to that of a cooperative, as union activities are often stagnant.

Therefore, in strengthening agricultural value chains through the use of digital technology, it is important to consider the role of relatively large and experienced organizer companies such as Babban Gona, Alluvial Agriculture, AFEX, and Thrive Agric, as well as individual service providers such as Hello Tractor, which is involved in farm machinery rental services. It is possible to promote the revitalization of extension services by supporting these organizers and specific service providers.

In addition, although the federal and state governments are still in the early stages of implementation, they are working to collect information on farmers and farmland, including small-scale farmers, create

databases, and develop human resources, which is expected to serve as a foundation to support the DX of agricultural policies. JICA's support is also highly appreciated, and it may be desirable to support for system development to expand the platform's functions and for extension services through the implementation of pilot projects, etc.

1.6.11 Cooperation policy for agricultural sector of Nigeria

Based on the issues in the agricultural sector, the trends of other aid agencies and JICA, and the status of the use of digital technology in agricultural VC, the Survey Team have established the following cooperation project proposal. Among these, priority projects in the financial and infrastructure fields will be discussed later.

Table 1-3 Implementation schedule of proposed cooperation project and expected impact on agricultural VC

Category	Projects	Schedule										Impacts on issues of agricultural sector		
		Year 1-5					Year 6-10					Production	Post-harvest	Distribution, processing
Finance	TSL Project for agricultural sector											Stimulate investment of producers and suppliers	Stimulate private investment for post-harvest Promote linkage of farmers to commercial VC	Stimulate private investment of processors
	Reform of BOA and agricultural policy finance											Stimulate investment of producers		
	Pilot projects on DX of cooperatives											Promote organization of farmers	Promote linkage of farmers to commercial VC	
	Upgrading APEX system of agricultural and credit cooperatives											Strengthen functions of cooperatives		
Infrastructure	Irrigation development project											Strengthen production infrastructure	Develop storage and processing facilities	
	Irrigation agriculture promotion project											Improve operation and maintenance of irrigation facilities Facilitate needs for mechanization and investment on small scale irrigation		
	Rural roads improvement project												Improve quality of rural roads	
	State post-harvest infrastructure development project												Promote investment in primary processing and storage facilities Promote linkage of farmers to commercial VC	Improve operation of processing companies
Other	Project to improve access to market information by pastoralists and reduce conflicts between pastoralists and farmers											Mitigate conflict between pastoralists and farmers Organization of pastoralists for higher productivity		
	Human resources development to accelerate ecosystem of agricultural machineries:											Facilitate investment in machineries and farmers' access to mechanization		
	Project to promote development of superior varieties and improve seed production systems											Promote R&D and production of varieties Promote farmers' access to good varieties		

Source: Survey team

Furthermore, based on the survey results for the 31 items mentioned above, we estimated the amount of increase in farmers' gross profit assuming that the unit yield improves to the same level as neighboring countries based on the current farmers' income and challenges/bottlenecks. The aggregate gross profit of farmers (in 2021) is N23.1 trillion, equivalent to 55% of the agricultural sector GDP in 2021 of N41.1 trillion. Gross profit increase from the data as of 2021 if assuming unit yield improvement would be N12.4 trillion, equivalent to 30.1% of agricultural sector GDP in 2021.

In the TSL project, which is one of the priority projects mentioned below, this will be used as a reference for the potential increase in farmers' income.

1.6.12 Current status of agricultural finance and support projects

(1) Current status and challenges of farmers and SMEs

A rural socio-economic survey was conducted to examine agricultural financing support measures. A total of 10 villages were selected in the five states of Benue, Nasarawa, FCT, Ondo, and Oyo, and a questionnaire survey was conducted targeting approximately 220 respondents such as farmers, agricultural VC small and medium-sized enterprises, anchor companies and cooperatives. Analysis of the results shows that in order for farmers to connect with commercial VCs and increase investment and income, they should 1) join group and participate commercial value chain, and 2) deepen their knowledge and experience in commercial transactions and finance, and 3) plan investment with a certain level of confidence. It is considered effective to provide support in a timely manner to each of those stages. Furthermore, although small and medium-sized enterprises generally have a strong appetite for investment, concerns were expressed regarding the high interest rates and short loan repayment periods when it comes to raising funds from financial institutions.

Calculations based on the survey results show that for both farmers and small and medium-sized enterprises, preferential loan conditions such as 9% of interest rate and 3-5 years of repayment period would enable the investment plan to be materialized rather than the loan conditions which are prevailing in the market.

For lenders, questionnaires survey was conducted concerning their intention to participate in TSL's PFI and loan conditions, etc. The results will be used for TSL project design and PFI selection.

(2) Fintech companies related to agricultural finance

In Nigeria, FinTech is a rapidly growing sector that has produced a large number of related startups. In the agricultural sector, companies are leveraging their technological capabilities to engage in payments, loans, deposits/investments, infrastructure/cryptography, insurance, etc., and are making a significant contribution to promoting investment and increasing productivity in the agricultural sector.

FinTech companies in the agricultural sector may serve as organizers and perform alternative functions to cooperatives, such as organizing and empowering farmers, supporting production and sales, etc. It is expected that these companies will play a leading role in the formation of TSL recipients, especially those with large scale and growth potential.

In promoting TSLs, it is also important to promote initiatives that contribute to the expansion of farmers' demand for funds, such as transparency of transactions, establishment of a system of collateral guarantees through e-warehouse receipts for products, improvement of the environment for farmers' access to finance through provision of credit information to farmers, and support for improving farming operations in cooperation with agents.

(3) Current status and challenges for financial institutions of agricultural finance

The market size of agricultural finance is as follows (Unit: N billion):

Agricultural loan balance		1,578
	Narrow definition of agricultural loans	1,458
	Banks (private funds)	605
	Banks (CBN's on-lending programs)	853
	BOI	72
	BOA	11
	Credit societies	37
Banks loans to enterprises on agricultural VC (private funds)		NA

CBN's program loans account for 59% of agricultural loans in a narrow definition. Government intervention funds (development finance) are thought to account for the majority in the field of agricultural financing. Against this background, the CBN has announced a policy to restructure its development finance. Priority projects in the field of agricultural finance need to be considered in light of this movement to review development finance in general.

(4) Priority projects for agricultural finance

Sudden suspension of CBN institutional financing could result in a so-called "hard landing" with serious negative consequences for the agricultural sector. We should aim for a "soft landing" toward a goal (To-be) of optimizing the composition ratio of banks' private funds, policy finance (development finance), cooperative finance, etc.

In addition to addressing issues in the agricultural sector, which are the main objectives of each of the following priority project proposals, they aim to improve on-lending program financing through TSL projects, and aim at the ideal form of future development finance. Those priority projects aim to create a synergistic effect by coordinating and supporting BOA's functions and scope, as well as the reform of the cooperative system, including credit cooperatives.

Name of Priority project: TSL project for the Nigerian agricultural sector

Scheme: Yen loan, Consulting service

Period: 5 years

Implementing agency: CBN, FMAFS

Project overview:

The Nigerian government's previous projects, ABP and CACS, boosted agricultural lending to some

extent, but they also faced issues such as the misuse of some funds for other purposes and low repayment ratios for farmers. In light of these issues, this project will provide funds through TSL to support the interest rate level and repayment period required by potential borrowers such as agricultural producers, and will also use this funding as an leverage to support agricultural producers using SHEP as an entry point in the consulting service for improving farmers' financial literacy and linkage with agricultural VC companies. On the lender side, the project will promote financial access through start-up's support services, support banks (and credit guarantee systems) to improve their ability to provide products, and support monitoring of target projects. This project aims to improve the productivity and income of the agricultural sector, especially small-scale farmers, and will implement this through agricultural financing which is one of the key items of the Nigerian government's agricultural sector productivity improvement policy.

Name of Priority project proposal: Pilot projects on DX of cooperatives

Scheme: Technical cooperation

Duration: 4 years

Implementing agency: FMAFS, NITDA

Project overview:

In Nigeria, the formal organization rate of agricultural cooperatives remains at around 30% to 40%, which is one of the challenges in farmers' access to finance and commercial value chain. Many start-up companies are providing quasi-agricultural cooperative services, and success stories are emerging, but if left to profit-making businesses, there is a risk that many farmers will be left behind. Meanwhile, NITDA is currently trialing NAVSA (a digitally-based farm management system). FMAFS positions the use of digital technology to improve the efficiency of extension services and policy implementation as a priority policy. This project aims to carry out a pilot project on the management of agricultural cooperatives using NAVSA and obtain suggestions for improving the total systems of agricultural cooperatives in the future.

Name of Priority project proposal: BOA reform support

Scheme: Technical cooperation

Period: 5 years

Implementing agency: FMAFS (BOA), CBN

Project overview:

BOA is a development financial institution that supports farmers' access to finance through direct loans to farmers and loans through cooperatives, but its current financial position is weak and it is difficult to expand its business. The Nigerian government has positioned BOA reform as a priority policy and says it will promote BOA's digitalization. BOA is planning to renew its core banking system. This project will support the reform of BOA's management and credit business, and support the bidding, ordering, and implementation management of the core banking systems that reflect the reforms to address the issues BOA faces. The Nigerian government has indicated a policy of reviewing the development finance system. If specific steps for the review are presented in the future, this project will consider and

support restructuring the overall development finance system, drawing on the experiences of Japan and other countries.

1.6.13 Current status of agricultural infrastructure and the support projects

(1) The role of agricultural infrastructure in addressing agricultural sector challenges

From the perspective of food security, Nigeria has the world's largest population of poor people (136 million people) and food security is in a tight situation. Although production of major crops is increasing, domestic demand exceeds supply due to population growth, and agricultural imports have increased in recent years, resulting in a large import surplus. While yields of major crops are lower than neighboring countries, it is difficult to expand farmland area, and there is a strong need to improve productivity, and the introduction of irrigation is an effective way to achieve this. On the other hand, post-harvest losses are large in Nigeria, and reducing this is also important. Comparing the effects of introducing irrigated agriculture and improving post-harvest loss, it is found that the increase in sales due to the introduction of irrigation is approximately twice as much as the improvement in post-harvest loss, so from the perspective of food security, introducing irrigated agriculture (improvement of irrigation facilities) is considered beneficial to focus on.

From a value chain perspective, production infrastructure (irrigation) has not fully utilized its high potential, and further expansion of irrigated area is required. Regarding distribution infrastructure, local roads lack a network and are in poor condition, and the lack of infrastructure at markets in production areas has become a bottleneck in the distribution of agricultural products, so both require improvement. Regarding post-harvest infrastructure, there is a need to expand storage facilities, upgrade processing facilities, and strengthen linkages between both facilities and related parties.

(2) Current status of policy and support from other donors

In terms of policy, the NDP calls for reducing the proportion of food imports, reducing post-harvest losses, extending local roads, expanding irrigated area, and strengthening storage and processing, and improvement of agricultural infrastructures are expected to contribute to their achievement. As for support from other donors, in the irrigation, the WB has implemented FADAMA and TRIMING, and is currently planning SPIN. Regarding local roads, the WB and AFD had been implementing RAMP, and its successor, RAAMP, is supporting the revitalization of agricultural distribution, including the development of agricultural distribution centers. In addition, the SAPZ, led by the AfDB, integrates agricultural production, processing, and storage functions, and supports the revitalization of business by private-sector stakeholders.

(3) Contents of priority project proposal

Positioning of priority project proposals

In order to improve agricultural infrastructure at each stage of production, distribution, and post-

harvest processing to improve the agricultural value chain, priority projects will be undertaken to establish irrigated agriculture at the production stage, improve local roads and local markets at the distribution stage, and expand storage and processing facilities at the post-harvest stage.

Priority Project: Irrigation Development Project
 Scheme: Project Loan
 Project Period: 5 years
 Implementing Agency: FMWRS
 Project Summary: Irrigation facilities will be developed as a project loan project. In Nasarawa-Laminga area, water intake facilities, headrace channels (14 km), irrigation canals (approximately 64 km), access roads (approximately 61 km), canals and road structures, drainage canals, offices, agricultural machinery, etc. are installed. In Duku-Lade area, plans include an earth dam (levee height 25 m, length 1.6 km), headrace canal (6 km), irrigation canal (17 km + tertiary canal), night reservoir, roads, administrative facilities, agricultural machinery, etc.

Priority Project: Irrigation agriculture promotion project
 Scheme: Technical Cooperation project
 Project Period: 5 years
 Implementing Agency: FMWRS, RBDA
 Project Summary: This project will be implemented in parallel with the development and functional improvement of irrigation facilities by a loan project. It will improve agricultural productivity by introducing irrigated agriculture, establish the operation and maintenance of irrigation systems, and strengthen the capacity of FMWRS and RBDA.

Priority Project: Rural road improvement project
 Scheme: Project Loan
 Project Period: 5 years
 Implementing Agency: FMAFS, State governments
 Project Summary: This project can be co-financed with RAAMP or Japan's own financing. It will improve the functionality of local roads, which are noticeably lacking or have degraded functionality, to improve access to the road network for rural residents, and expand the functionality of agricultural distribution centers.

Priority Project: State post-harvest infrastructure development project
 Scheme: Sector Loan or Co-Financing
 Project Period: 5 years
 Implementing Agency: FMAFS, State governments

Project Summary: This project can be co-financed with SAPZ or Japan's own financing. It will establish an agricultural industry hub at the state level, create an environment where related parties and private companies can gather, improve productivity and logistics in surrounding areas, strengthen the capacity of related parties, and build overall systems.

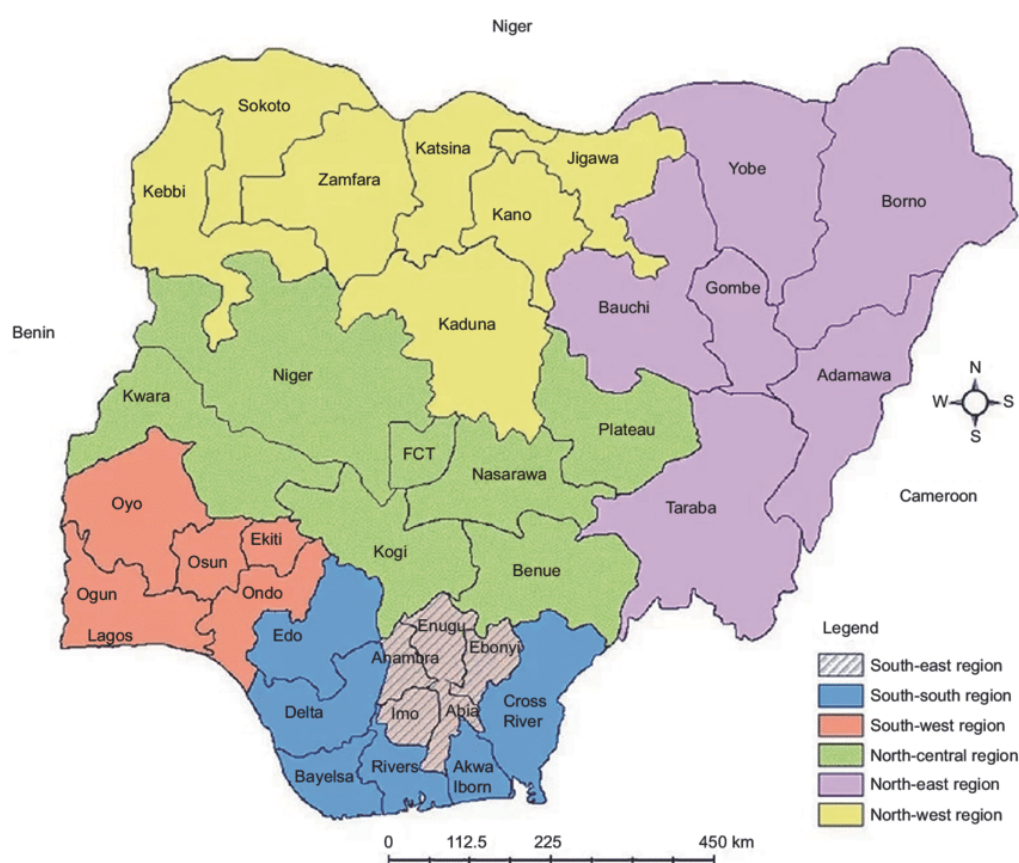
2 Analysis of the Agricultural Sector in Nigeria

2.1 Overview of Agricultural Sector in Nigeria

2.1.1 Overview of Agricultural Sector

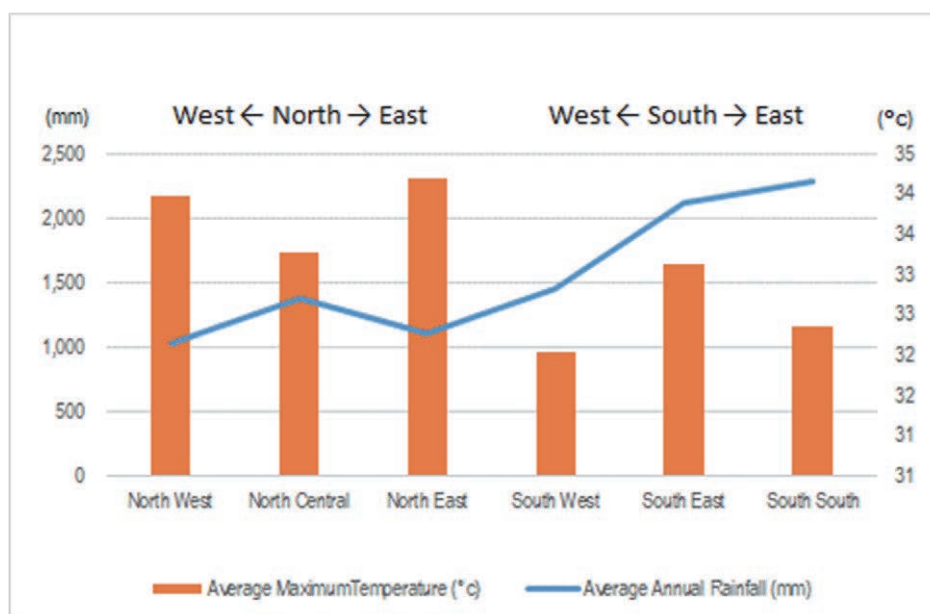
The agriculture sector in Nigeria is the most important sector, accounting for 24% of GDP and 34% of the working population. With about 77% (about 71 million hectares) of the country's land area suitable for cultivation, fertile soil, and abundant water resources, the country has the potential to expand agricultural production and employment.

Nigeria has diverse climatic conditions. Looking at temperature and rainfall by 6 geopolitical zones grouping 36 states and 1 Federal Capital Territory (FCT), maximum temperature is higher in the north and rainfall is higher in the south. These differences in weather conditions are also reflected in differences in agricultural products. For example, among cereals, rice and maize production are high in the north, especially in the North Central region, while production of cassava, yam, and cocoyam are high in the south and North Central region. Among export crops, sesame and ginger are mostly produced in the north, and cocoa is centered in the south.



Source: Prevalence of chronic kidney disease in Nigeria: Systematic review of population-based studies (Chukwuonye et al, 2018)

Figure 2-1 Geopolitical zone



Note: Temperature and rainfall is average of 2020 and 2021

Source: APS 2020, APS2021

Figure 2-2 Temperature and Rainfall by Geopolitical Zone

The agricultural sector faces various challenges and fails to fully utilize its potential. The challenges include inadequate access to good quality seeds and farming methods, lack of access to mechanization services, inefficiency of distribution in rural areas, quality deterioration due to primary processing in small factories, lack of investment due to difficulties in financial access, and distribution problems from the production area to the consumption area.

In response, the federal government has improved the agricultural sector through The Economic Recovery and Growth Plan (ERGP 2017-20), The Agriculture Promotion Policy (APP) 2016-2020, and the Presidential Initiative on Fertilizer. As a result, since 2016, the yield of crops such as sesame and maize has improved, and exports of sesame, cacao, ginger, etc. have increased.

However, low agricultural productivity still remains a major issue. Compared with neighboring countries, Nigeria lags behind in productivity of seven of the ten major cereal crops, and the productivity of tomatoes and other vegetables is also generally low. In addition, the productivity of cocoa and cashew nuts among major export products is low as compared with the neighboring countries. From a different point of view, however, there is a room of significant improvement to increase the production if the productivity is successfully increased to the level of the neighboring countries.

Table 2-1 Comparison of Yield of major products with neighboring countries

(Unit: tons/ha)

Product	Benin	Burkina Faso	Coted'Ivoire	Ghana	Guinea	Liberia	Nigeria	Senegal	Togo	Average excl. Nigeria	Nigeria / Average
Rice	4.1	2.1	2.9	3.0	1.5	1.1	1.9	3.7	1.6	2.5	0.77
Maize	1.2	1.7	2.2	2.7	1.5	NA	2.1	2.6	1.2	1.9	1.13
Sorghum	1.0	1.0	0.7	1.1	1.5	NA	1.2	1.3	0.9	1.1	1.10
Yam	12.8	7.5	5.5	18.5	8.5	8.7	8.5	17.0	8.7	10.9	0.78
Cassava	11.7	15.6	6.4	22.5	9.1	8.2	6.9	13.8	3.7	11.4	0.61
Millet	1.0	0.8	0.9	1.3	1.3	NA	1.0	1.1	0.6	1.0	0.96
Cocoyam	3.4	NA	1.2	6.5	4.6	9.2	3.9	NA	3.3	4.7	0.84
Plantain	NA	NA	3.8	11.2	5.2	2.2	6.3	NA	NA	5.6	1.12
Potatoes	11.8	5.5	NA	NA	12.4	NA	3.8	24.0	NA	13.4	0.28
Soybean	1.3	1.2	1.5	1.7	NA	0.4	0.9	NA	0.5	1.1	0.86
Cowpea	NA	0.5	NA	1.4	NA	NA	0.8	0.8	NA	0.9	0.86
Tomatoes	6.8	17.2	10.4	7.8	NA	13.6	4.2	16.4	4.3	10.9	0.39
Okra	3.7	7.4	2.8	21.4	NA	NA	1.3	36.0	NA	14.3	0.09
Sesame seed	0.8	0.6	0.2	NA	0.2	NA	0.9	0.9	0.3	0.5	1.73
Ginger	NA	NA	13.5	1.2	NA	NA	8.8	NA	NA	7.3	1.21
Groundnuts	1.1	0.6	1.7	1.0	1.2	0.8	1.1	1.4	0.7	1.0	1.04
Cocoa	NA	NA	0.5	0.6	0.5	0.2	0.3	NA	1.1	0.6	0.47
Cashew	0.4	1.1	0.4	0.5	1.7	NA	0.7	0.4	1.5	0.9	0.83

Source: FAO STAT, 2021 data

Food security is also a highlighted challenge facing Nigeria's agricultural sector. Nigeria's international ranking of the Global Food Security Index is 107th in the most recent survey, which is low among the neighboring countries³.

Table 2-2 Comparison of area harvested and food security with neighboring countries

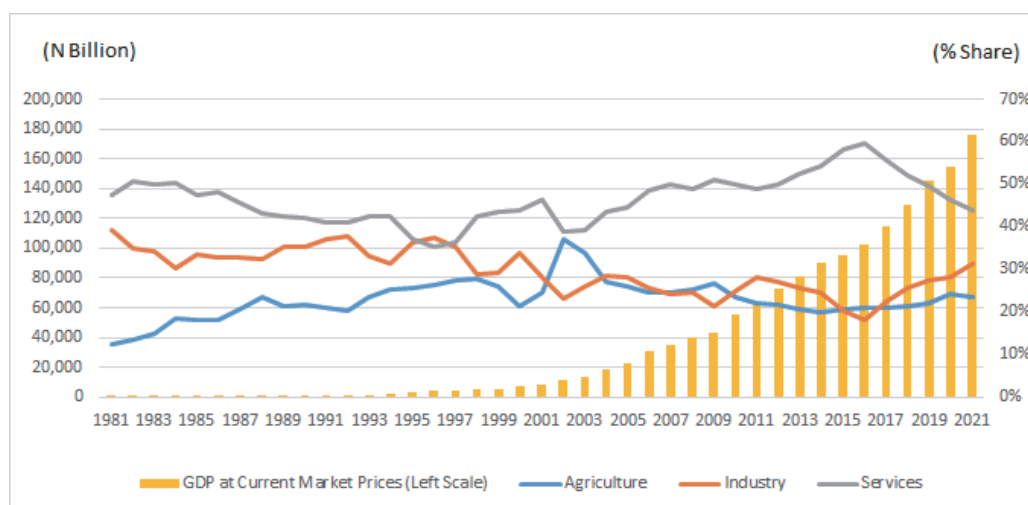
Country	Area harvested(Million ha)	Food Security Index (ranking in 113 countries)
Benin	4.9	91
Burkina Faso	8.3	89
Cote d'Ivoire	8.7	95
Ghana	6.2	83
Guinea	5.3	99
Liberia	0.5	NA
Nigeria	59.0	107
Senegal	3.9	86
Togo	2.6	98

Source: FAO STAT, Global Food Security Index 2022

The agricultural sector's share of nominal GDP has increased slightly since 2015, reaching 23% in 2021. On the other hand, the real GDP growth rate of the agricultural sector was 2.4% annually over the

³ The Global Food Security Index is an index compiled by The Economist Newspaper, which compiles related indicators, converts them into scores for international comparison, and publishes rankings of each country. The indicators consist of four categories: Affordability, Accessibility, Quality and Safety, and Sustainability and adaptation. Nigeria ranks 28th out of 28 sub-Saharan countries in terms of Affordability (particularly food price hikes) and 26th for Availability (particularly farmers' selling prices, access to extension services, farmer organization, agricultural research and development, conflict, corruption, and gender inequality).

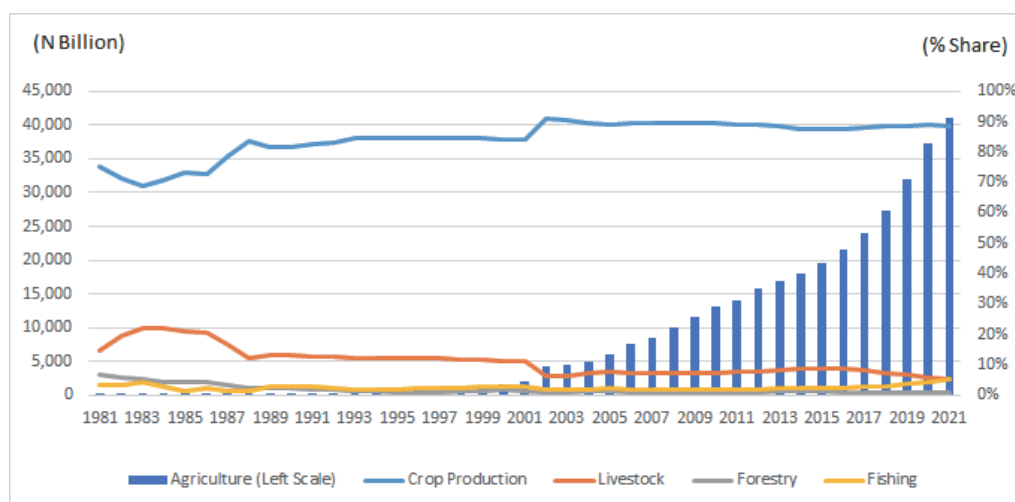
five years until 2021. The federal government has set a target of raising the real growth rate of the agricultural sector to 3.7% in the National Development Plan (NDP).



Source : Made by the survey team based on CBN, Statistics Bulletin

Figure 2-3 Yearly GDP by sectors

Looking at yearly changes of GDP in the agricultural sector by breakdown such as agricultural products, livestock, forestry, and fisheries, agricultural products have accounted for 90% over the past decade or so. Over the past five years, livestock production has declined slightly, while fisheries production has risen slightly. In light of this current situation, the Federal Government has positioned that the share of livestock and fisheries in GDP should be increased.

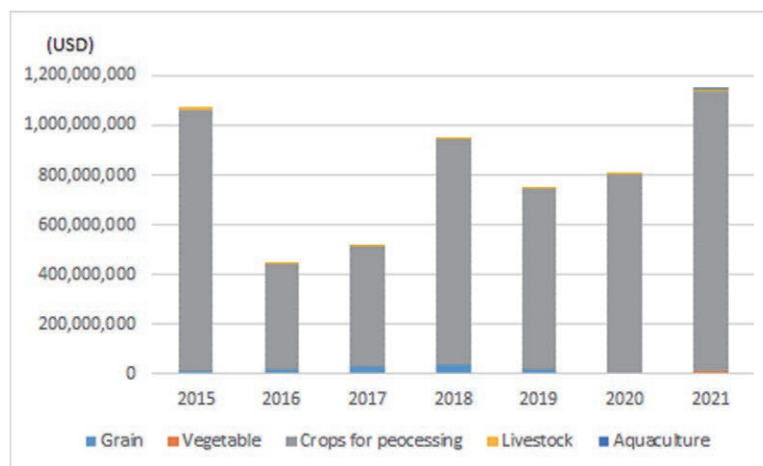


Source: Made by the survey team based on CBN, Statistics Bulletin

Figure 2-4 Yearly changes of breakdown of agricultural sector in GDP

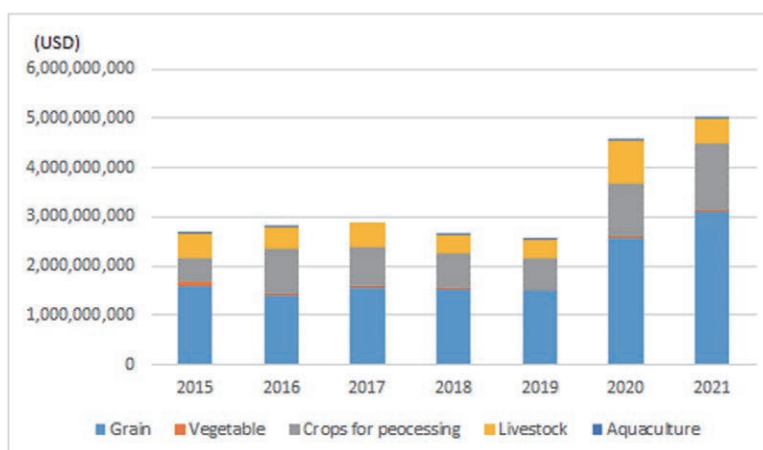
In terms of trade, looking at the exports and imports of the surveyed items and their processed products, which will be described later, exports was about \$1.1 billion and imports was about \$5 billion in 2021. Most of the exports are crops for processing, with 66% of them related to cocoa and 31%

sesame. Concerning big imported items, wheat-related products accounted for 97% of the category of cereals. Sugar-related products accounted for 66% and palm oil-related accounted for 32% of the group of crops for processing. Dairy products accounted for 99% among livestock-related products. In the meantime, Nigeria's total exports in 2021 was \$47.2 billion and its imports was \$52 billion.



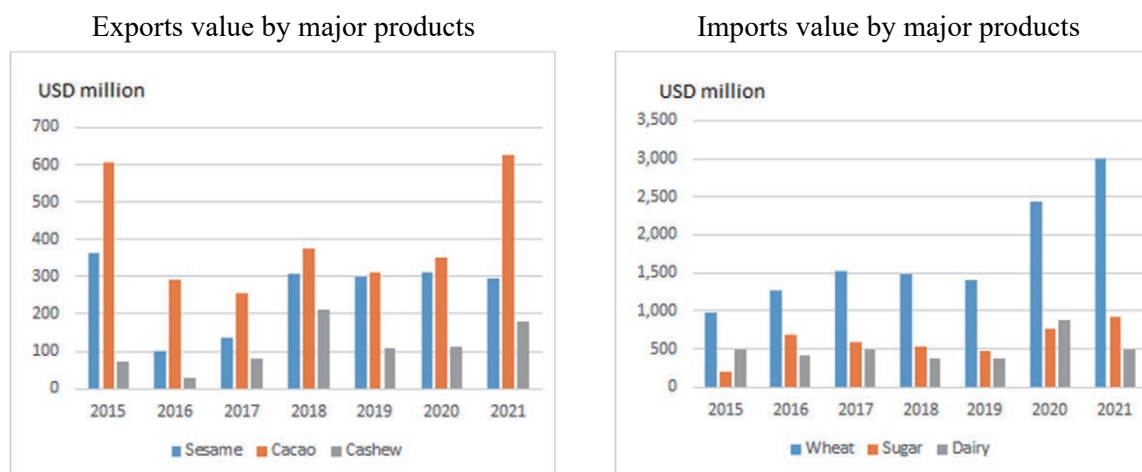
Source: Made by Survey team based on UC ComTrade

Figure 2-5 Exports value by category of products



Source: Made by Survey team based on UC ComTrade

Figure 2-6 Imports value by category of products



Source: Made by Survey team based on UC ComTrade

Figure 2-7 Exports and Imports value by major products

2.1.2 Analysis of value chain of major commodities

To study issues of value chain with details inside the different commodities, Survey team chose the 20 priority commodities listed by National Agricultural Technology and Innovation Policy (NATIP) (underlined in the next table) plus other items which the Survey team has chosen to broadly cover items in terms of the food supply and production opportunities⁴. As a result, the total 31 commodities are sorted to 5 categories by the team. For those commodities, the current status and challenges in production, distribution, processing, and sales markets, as well as opportunities and the bottlenecks were studied and compiled in the IC/R. The following section recalls their summary with some updates acquired during the field survey in Nigeria⁵.

Table 2-3 Target commodities for survey on agricultural sector

5 Categories	Commodities
Cereal	<u>Rice</u> , <u>maize</u> , <u>sorghum</u> , <u>yam</u> , <u>cassava</u> , millet, cocoyam, plantain, <u>wheat</u> , <u>potatoes</u> , <u>soybeans</u> , Total 11 commodities
Vegetable	<u>tomatoes</u> , <u>cowpea</u> , okra, <u>orange</u> , total 4 commodities
Crops for processing	<u>sesame</u> , <u>cocoa</u> , <u>ginger</u> , <u>groundnuts</u> , <u>oil palm</u> , <u>cashew</u> , <u>sugarcane</u> , <u>cotton</u> , <u>hibiscus</u> , total 9 commodities
Livestock	Beef, sheep, goat, swine, poultry, total 5 commodities
Aquaculture	Tilapia, Catfish, total 2 items

Source: Survey team.

⁴ The additional items are listed in the FMAFS “National Report of Wet Season Agricultural Performance in Nigeria 2021” (commonly known as APS). Millet, cocoyam, and plantain are chosen because they are consumed as basic foods. Okra is chosen as representing vegetables as okra is most commonly produced through all the States. In addition, cattle, sheep, goats, pigs, and chickens are chosen as they are items which are the most-bred livestock that FMAFS states should be promoted. Tilapia and catfish are chosen as they are top 2 items produced in aquaculture that FMARD also states should be promoted.

⁵ In this report, target items are classified from a value chain perspective. For processing crops and vegetables with specific value chains, the applicable items are categorized separately, and the remaining items are grouped together, with the most representative category name, “Cereal”.

The table below shows the aggregated figures of Food and Agriculture Organization of the United Nations (FAO)'s Food Balance statistics (values include agricultural products and related processed products (products in downstream of VC)) for the target items. According to this aggregation, the surveyed items account for 87% of production and 74% of imports in Nigeria's overall food supply. In terms of demand, it accounts for 87% of edible (food) and 93% of exports. Therefore, it is possible to understand current situation and challenges for the overall agricultural sector as well as for high-priority by reviewing those target commodities.

Table 2-4 Position of aggregated target commodities in the food balance (2020)

Target commodities	FAO Food Balance (unit: thousand tons)							
	Supply		Demand					
	Production	Import	Food	Non-food	Feed, Seeds	For processing	Export	Waste
Cereal	146,725	7,701	84,351	3,642	39,622	1,547	58	9,888
Vegetable	22,020	184	18,765	0	1,073	0	26	2,353
Crops for processing	7,701	1,238	3,986	1,021	224	2,335	645	540
Livestock	2,463	11	2,117	0	15	237	0	105
Aquaculture	662	2	264	0	0	0	0	0
Total	179,571	9,136	105,483	4,663	40,934	4,119	729	12,886
Whole agricultural sector	206,323	12,316	126,277	4,684	41,249	14,804	788	15,054
Total of target commodities/W hole agricultural sector	87%	74%	87%	100%	99%	28%	93%	86%

Source: Made by the survey team based on FAO Food Balance

Current status, opportunities and challenges are summarized for each of the 5 categories of the target commodities.

(1) Cereal

1) Current status

From left to right, the table below shows farmers' production volume, cultivated area, yield, farmers' income and gross profit (per hectare), and nationwide sales (all the data is for 2021). Further to right, the data shows the annual growth rate of domestic demand, the annual growth rate of exports, and the average import ratio for the five years from 2015 to 2020 in FAO's Food Balance statistics (including related processed items). In addition, the data continues to show export and import value averaged for 2020 and 2021 from the UN ComTrade Database (ComTrade).

Table 2-5 Overview of commodities of cereal

Commodities	Production (K tons)	Cultivation area (K ha)	Yield (tons/ha)	Income of farmers (N/ha)	Gross profit of farmers (N/ha)	Aggregated sales (N million)	Annual growth of domestic demand in the past 5 years (FAO)	Annual growth of export in the past 5 years (FAO)	Average of import to domestic supply ratio of the past 5 years (FAO)	ComTrade: Export Ave. 2020-2021 (USD million)	ComTrade: Import Ave 2020-2021 (USD million)
Rice	8,342	4,195	1.99	1,011,320	736,320	4,371,208	3.8%	NA	8.9%	1.3	21.0
Maize	12,745	5,500	2.32	550,168	317,168	3,300,955	3.0%	-3.0%	3.0%	1.1	68.2
Sorghum	6,725	5,600	1.20	279,613	151,613	1,593,825	-1.8%	-19.7%	0.0%	0.3	7.3
Yam	50,377	6,200	8.12	998,642	416,642	5,894,149	3.3%	NA	0.0%	0	0.0
Cassava	63,031	7,290	8.65	589,679	311,679	5,357,667	0.8%	36.6%	0.0%	0.7	0.3
Millet	1,922	2,000	0.96	236,406	125,406	472,812	5.3%	-16.7%	0.0%	0	0.3
Cocoyam	8,202	1,389	5.90	1,981,200	1,625,778	4,166,616	-1.9%	NA	0.0%	0	0.0
Plantain	7,388	495	14.94	1,786,890	1,296,212	938,276	0.1%	NA	0.0%	0	0.0
Wheat	90	50	1.80	43,875	43,648	3,510	3.9%	8.4%	98.1%	0.6	2713.2
Potatoes	1,217	319	3.81	533,750	261,750	170,364	1.0%	0.0%	1.0%	0.3	9.4
Soybeans	980	972	1.01	453,936	323,936	480,200	2.1%	16.1%	7.9%	3.9	22.4

Note: Farmer production, cultivated area, yield, income, gross profit, and sales are in 2021. FAO data are for the five years from 2015 to 2020. ComTrade data are averages for 2020 and 2021.

Source: Data on production are from APS, FAO STAT, and some interviews.

Yam, cassava, and rice are the largest in terms of the aggregated sales value. Rice, maize, yam, millet, and wheat have domestic demand increasing by more than 3% annually. The import ratio is high for wheat, which is overwhelmingly dependent on imports, while rice and soybean observe the import ratio of 7% to 8%. However, imports of rice dropped to a few percent due to an import ban beginning in 2016, but imports increased beginning in 2019 due to the lifting of the ban, with the import ratio in 2021 at 14.9%.

Table 2-6 Production volume of cereal commodities by Zone in 2021 (thousand tons)

Zone	Rice	Maize	Sorghum	Yam	Cassava	Millet	Cocoyam	Plantain	Wheat	Potatoes	Soybean
1_North East	1,479	3,207	2,030	3,431	3,197	779	223	0	11	0	238
2_North Central	3,197	3,279	1,646	22,690	15,682	434	1,076	398	2	2	533
3_North West	1,967	2,878	2,971	3,780	5,269	714	0	0	24	0	352
4_South East	483	691	14	10,189	9,265	0	2,488	2,656	0	0	0
5_South South	551	751	0	10,569	11,926	0	2,376	4,335	0	0	0
6_South West	665	1,941	65	9,224	12,899	0	2,039	0	0	0	42
Total	8,342	12,747	6,726	59,884	58,238	1,927	8,203	7,389	37	2	1,166

Note: Production volume by zone mainly refers to data by state in APS2021, but some items for which there is no data in APS2021 are based on “Report of Wheat Production in Nigeria, 2021” and “NATIONAL BUREAU OF STATISTICS/FEDERAL MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT COLLABORATIVE SURVEY ON NATIONAL AGRICULTURE SAMPLE SURVEY (NASS) 2010/2011”, “The vegetable and potato sector Nigeria, 2019”. For this reason, the total production volume differs from the production volume in the previous table (since the data in the previous table is nationwide production volume, it is based on FAO STAT and interviews with FDA). In the same way, as for the data of vegetables and the followings, the national data acquired from FAO and FDA differs from the aggregated state-by-state data which are based on APS supplemented by other sources.

Source: APS, other literature, partly based on interviews

2) Opportunities and challenges

Opportunities: There are potentials such as steady increase in domestic demand, large room for import substitution, room for domestic production of feed such as maize and increase value addition by domestic production of processed foods.

Challenges in production: Those include lack in access to good quality seeds and farming methods (due to insufficient extension system, high price, and restrictions on imported seeds); lack of irrigation facilities; lack of post-harvest storage facilities. For wheat, for example, there is no supply of high-yielding seeds suitable for the Nigerian climate from government agencies, and it is necessary to develop supply routes through millers. In potatoes, farmers, extension workers and pesticide dealers lack the basic knowledge needed to control viral diseases, bacterial wilt and late blight. Besides, low profitability and lack of incentives for farmers prevent feasibility of investment for some commodities. Difficulty in accessing agricultural machinery services is another challenge.

Challenges in distribution: There is no mechanism for small-scale farmers, who account for the majority, to participate in the value chain (VC). Cocoyam and plantains, for example, are consumed locally, and there are few shipping routes for processed products with higher added value. Primary processing in small-scale factories in rural areas tends to result in low-quality products. Cassava, for example, relies on small-scale processing plants (with old equipment) because most of the sales channels are small, and the quality is low.

Furthermore, there is no mechanism to transmit grading, market supply and demand, and price information to producers in a timely manner (They depend on traders in the vicinity of production areas). For rice, for example, there is no system for grading the quality of rice in many production areas, so it is difficult for farmers to recognize the goal of increasing added value. In addition, farmers rely on traders who intervene between rice millers and farmers, they are ignorant of market price information and may be harassed.

(2) Vegetables

1) Current status

Among the vegetables listed below, cowpea has the largest sales value, with domestic demand increasing at an annual rate of 6.8% over the past five years. Domestic demand for tomatoes declined by 4.1% annually due to the high figure in 2015, but increased by 5.1% annually over the last four years from 2014. Tomatoes are 10% dependent on imports.

Table 2-7 Overview of commodities of vegetables

Commodities	Production (K tons)	Cultivation area (K ha)	Yield (tons/ha)	Income of farmers (N/ha)	Gross profit of farmers (N/ha)	Aggregated sales (N million)	Annual growth of domestic demand in the past 5 years (FAO)	Annual growth of export in the past 5 years (FAO)	Average of import to domestic supply ratio of the past 5 years (FAO)	ComTrade: Export Ave. 2020-2021 (USD million)	ComTrade: Import Ave 2020-2021 (USD million)
Cowpea	3,629	4,688	0.77	403,599	225,599	1,897,764	6.8%	NA	0.0%	0.05	1.4
Tomatoes	3,576	849	4.21	550,394	288,394	464,876	-4.1%	NA	10.0%	0.07	9.7
Okra	1,917	1,460	1.31	217,821	12,821	325,959	0.5%	17.3%	0.1%		1.5
Orange	4,112	849	4.84	508,551	150,551	431,760	0.0%	NA	0.0%	0.2	5.0

Note: Farmer production, cultivated area, yield, income, gross profit, and sales are in 2021. FAO data are for the five years from 2015 to 2020. ComTrade data are averages for 2020 and 2021. The production and yield of cowpea in this table are for the dry seed stage, and the production data by state in the following table are before drying.

Source: Data on production are from APS, FAO STAT, and some interviews.

Production data for cowpeas, tomatoes, and okra were obtained from FAO STAT, and those for oranges were obtained through interviews with the FDA. On the other hand, since the production volume by zone in the next tables was made by aggregating the data by States sourced from APS, the total value does not match the production volume in the previous table.

Table 2-8 Production volume of vegetables commodities by Zone in 2021(thousand tons)

Zone	Cowpea	Tomatoes	Okra
1_North East	1,341	404	314
2_North Central	957	609	464
3_North West	893	895	245
4_South East	310	426	300
5_South South	193	457	158
6_South West	519	685	321
Total	4,213	3,476	1,803

Source: APS

2) Opportunities and challenges

Opportunities: The effect on food security in terms of nutrition can be expected, and there is a lot of room for increasing demand. In addition, there is room for export market development as well as improving durability in the distribution by converting raw products to a processed product.

Challenges in production: Yield is low due to problems of access to high-quality seeds (lack of extension workers, high prices), high prices of agricultural materials such as pesticides which makes it difficult for small-scale farmers to access. In addition, especially for tomatoes, small scale irrigation equipment may improve yields and even produce multiple times per year, but small scale farmers who are not organized into formal cooperative often have difficulty obtaining funds.

Challenges in distribution: Another problem with vegetables is the high amount of waste after harvesting. For example, cowpeas need to be dried quickly after harvesting, but there is a lack of suitable storage and drying facilities near producers. In the distribution stage after that, since it depends on small

collectors and informal distribution, the amount of waste is large due to the mismatch between the production cycle and market supply and demand, poor roads, lack of cold chain, etc.

(3) Crops for processing

1) Current Status

Oil Palm is marked with the largest sales value with its large production volume, followed by groundnuts. Domestic demand for ginger is growing at an annual rate of 28.6%, while demand for groundnuts and sesame is also increasing. Cocoa, sesame, and cashew nuts account for the largest amount of exports, with increasing trend in FAO statistics over the past five years. On the other hand, sugar cane and palm witnessed large import value.

Table 2-9 Overview of commodities of crops for processing

Commodities	Production (K tons)	Cultivation area (K ha)	Yield (tons/ha)	Income of farmers (N/ha)	Gross profit of farmers (N/ha)	Aggregated sales (N million)	Annual growth of domestic demand in the past 5 years (FAO)	Annual growth of export in the past 5 years (FAO)	Average of import to domestic supply ratio of the past 5 years (FAO)	ComTrade: Export Ave. 2020-2021 (USD million)	ComTrade: Import Ave2020-2021 (USD million)
Sesame seed	440	508	0.87	469,474	346,474	233,200	2.3%	8.0%	0.1%	304.5	0.1
Ginger	768	86	8.97	2,210,050	1,635,050	192,076	28.6%	13.2%	1.4%	13.1	0.2
Cotton seed	242	510	0.47	309,435	144,435	59,290	-4.1%	-12.9%	4.9%	NA	0.5
Oil Palm	10,063	3,938	2.56	1,792,000	1,175,000	7,044,100	0.4%	-27.5%	54.2%	0.1	359.0
Groundnuts	4,608	4,119	1.12	534,986	380,986	2,285,404	5.1%	NA	0.1%	0.1	1.7
Cocoa	280	1,076	0.26	615,300	483,944	294,000	0.0%	2.1%	0.0%	487.3	20.0
Hibiscus	24	12	2.00	611,910	373,910	23,800	NA	NA	NA	6.8	1.1
Cashew nuts	119	159	0.75	422,400	232,400	52,194	-2.4%	-4.4%	8.3%	147.2	0.0
Sugar cane	1,498	85	17.58	410,400	201,391	35,953	0.9%	NA	85.4%	0.0	836.1

Note: Farmer production, cultivated area, yield, income, gross profit, and sales are in 2021. FAO data are for the five years from 2015 to 2020. ComTrade data are averages for 2020 and 2021. The production and yield of palm oil in this table are for the “Oil Palm Fruit” stage, and the next table is for the “Crude Palm Oil” stage, so the weight differs.

Source: Data on production are from APS, FAO STAT, and some interviews. Production volume of hibiscus is based on “Tackling Hibiscus export ban to Mexico, The Nation Newspaper, 2019, <https://thenationonline.net/tackling-hibiscus-export-ban-to-mexico/>”.

The production data in the previous table were obtained from FAO STAT for sesame, ginger, palm oil, groundnuts, cocoa, cashew nuts and sugarcane, and from APS for cotton. The production data of hibiscus was obtained from another publication (see footnote in table above).

On the other hand, the following table shows the production volume by zone. Total values of each product items do not match the previous table as they were taken from various literature (see footnote in following table).

Table 2-10 Production volume of crops for processing by Zone in 2021(thousand tons)

Zone	Sesame seed	Ginger	Cotton	Oil Palm	Groundnuts	Cocoa
1_North East	103	33	85	0	1,305	7
2_North Central	376	134	7	0	1,674	2
3_North West	94	540	149	0	1,274	0
4_South East	0	0	0	373	21	3
5_South South	0	0	0	445	52	99
6_South West	0	0	3	101	161	259
Total	573	707	243	919	4,486	370

Note: There is no exhaustive data on oil palm production by state, and only some states' data for 2011/2012 year season were collected from "Appraising the Changing Trends in Oil Palm Farming in Nigeria's Lower South Region". For cocoa, the data is aggregated for the 2011/2012 season from "COCOA PRODUCTION PATTERN IN NIGERIA: THE MISSING LINK IN REGIONAL AGRO-ECONOMIC DEVELOPMENT".

Source: APS, other literature: Data for oil palm was based on "Appraising the Changing Trends in Oil Palm Farming in Nigeria's Lower South Region". Data for cocoa was based on "COCOA PRODUCTION PATTERN IN NIGERIA: THE MISSING LINK IN REGIONAL AGRO-ECONOMIC DEVELOPMENT".

2) Opportunities and challenges

Opportunities: Export market is expected to increase. It is hoped that the number of processing industries will be increased to stimulate domestic demand.

Challenges in production: Challenges on the production side are that international standard farming methods and seed dissemination are not sufficient in the face of global competition, and the quality is not high. In addition, there are problems in terms of cost and quality due to lack of mechanization of post-harvest processing.

Challenges in distribution: Groundnuts are often purchased by small traders on traditional buyer's credit, which adds to the cost of interest, and reliance of the small scale traders on their personal networks result in a lot of unsold waste. In the export products such as cocoa, sesame, cashew nuts, etc., congestion around ports has caused problems such as increased costs and requests by foreign buyers for price reductions due to delays in delivery to import destinations.

(4) Livestock (meat, dairy)

1) Current status

Ranking of sales value is eggs, beef, goat, chicken, and sheep in order. Dairy products account for a large amount of imports, while processed pork and chicken products are also imported with increase in recent years.

Table 2-11 Overview of commodities of livestock

Commodities	Production (K tons)	Population (K heads)	Aggregated sales(N million)	Annual growth of domestic demand in the past 5 years (FAO)	Average of import to domestic supply ratio of the past 5 years (FAO)	ComTrade: Import Ave. 2020-2021(USD million)	ComTrade: Import volume Ave. 2020-2021(K tons)	ComTrade: Annual growth of import volume 2016-2021
Cattle	333	18,697	447,821	-4.1%	NA	0	0	NA
Sheep	152	47,706	301,899	0.9%	NA	0	0	NA
Goats	258	76,729	422,485	NA	NA	NA	NA	NA
Dairy	531	2,248	20,160	0.4%	0.7%	685.5	158.4	NA
Pig	310	8,005	NA	1.4%	NA	2.7	3.3	62.3%
Chicken	241	168,583	358,164	2.7%	2.9%	2.0	0.5	16.6%
Eggs	579	123,143	816,910	-0.3%	0.4%	0.0	0.0	0

Note: Farmer production, population, and aggregated sales are in 2021. FAO data are for the five years from 2015 to 2020. ComTrade data are averages for 2020 and 2021. The number of cattle population raised is divided into cattle for meat and dairy products.

Source : Production and population is based on FAO STAT. Consistent data such as the number of animals raised and the production volume per head of meat and dairy products is available at FAO.

Table 2-12 Population of livestock and poultry by Zone in 2021 (heads)

Zone	Cattle	Sheep	Pig	Goats	Chicken
1_North East	5,324,651	6,874,633	962,999	8,750,050	23,417,527
2_North Central	4,140,181	8,116,752	3,891,246	19,633,364	52,631,168
3_North West	10,790,016	28,175,421	857,284	29,371,896	67,460,090
4_South East	16,985	863,644	817,888	5,497,144	30,933,716
5_South South	163,741	2,038,689	638,007	8,152,505	16,107,912
6_South West	149,578	1,857,252	1,774,464	12,634,200	33,143,723
Total	20,585,152	47,926,391	8,941,888	84,039,159	223,694,136

Note: The numbers in the previous table are based on FAO STAT data and do not match the totals of APS data by States

Source: APS

2) Opportunities and Challenges

• Meat and Dairy

Opportunities: Domestic demand for meat and dairy products is expected to increase. There is also the possibility of import substitution of dairy products, high added value of domestic companies, and export.

Challenges in production: Pastoralists are widely distributed, making it difficult for public agencies and traders to reach producers, and additional costs are incurred to ensure input supply and access to markets.

Challenges in distribution: Cold chain is not developed. For processing, it may be difficult to raise the funds to invest in equipment to improve quality of milk and dairy products.

• Poultry

Opportunities: Domestic demand for chicken meat is on the rise and is expected to continue growing. There is also room for improving cost and supply stability by substituting imported feeds by domestically produced maize for poultry feed.

Challenges in production: Small scale producers have high production costs because they lack access to high-quality, inexpensive feed and centralized management systems. In particular, the price of eggs tends to be determined by the supply of large, cost-efficient producers, and small scale farmers face the challenge of improving cost efficiency through investment and collective marketing.

In addition, the federal government is promoting epidemic control.

Challenges in distribution: Producers are often located far away from processors and broiler dealers, making it difficult to respond to seasonal demand in a timely manner.

(5) Aquaculture

1) Current status

Catfish and tilapia account for the majority of aquaculture, with catfish having the highest sales.

Table 2-13 Overview of commodities of aquaculture

Commodities	Production (K tons)	Cultivation area (K ha)	Yield (tons/ha)	Income of farmers (N/ha)	Gross profit of farmers (N/ha)	Aggregated sales (N million)	Annual growth of domestic demand in the past 5 years (FAO)	Annual growth of export in the past 5 years (FAO)	Average of import to domestic supply ratio of the past 5 years (FAO)	ComTrade: Export Ave. 2020-2021 (USD million)	ComTrade: Import Ave 2020-2021 (USD million)
Catfish	276	17	15.98	13,167,520	5,114,520	227,424	-16.7%	NA	0.2%	0.1	0.9
Tilapia	96	14	6.89	6,269,900	914,900	87,360	-16.7%	NA	0.2%	0.1	0.9

Note: Farmer production, cultivated area, yield, income, gross profit, and sales are in 2019. FAO data are for the five years from 2015 to 2020. ComTrade data are averages for 2020 and 2021.

Source: APS for production volume, WorldFish for data on yield, income, gross profit and sales.

Table 2-14 Production volume of aquaculture by Zone in 2019 (thousand tons)

Zone	Cat fish	Tilapia
1_North East	103	71
2_North Central	29	2
3_North West	2	1
4_South East	34	2
5_South South	16	1
6_South West	93	20
Total	276	96

Source: APS

2) Opportunities and challenges

Opportunities: Steady growth is expected as the population increases in the future. There is a possibility that it can be a substitute for mackerel, etc., which currently depends on imports.

Challenges in production: Lack of financial access is a bottleneck for promoting investment. Profitability may be low.

Challenges in distribution: Waste and low selling prices due to the undeveloped cold chain are problems. Financial access for each actor in the value chain (producers, processors, distributors) is also an issue.

(6) Expected impacts

The Survey team calculated the amount of increase in farmers' gross profits assuming that yields would improve, for example, to the same level as neighboring countries in response to challenges and bottlenecks (excluding livestock farming, for which sufficient data was not available). The aggregate gross profit of farmers (in 2021) is N23.2 trillion, equivalent to 56% of the agricultural sector GDP in 2021 of N41.1 trillion. Gross profit increase from the data as of 2021 if assuming yield improvement would be N12.4 trillion, equivalent to 30.1% of agricultural sector GDP in 2021.

Table 2-15 Estimated gross profit and sales revenue of farmers

Category	Gross profit (N million)	Sales (N million)	Gross profit in improved yield (N million)	Sales in improved yield (N million)
Cereal	13,964,381	26,749,582	6,134,197	32,883,779
Vegetable	1,449,171	3,120,359	4,662,159	7,782,518
Crops for processing	7,148,487	10,184,065	1,500,332	11,684,397
Livestock	416,691	2,417,983	NA	NA
Aquaculture	101,083	314,784	74,701	389,485
Total	23,082,813	42,786,773	12,371,389	55,107,618

Source: Made by the survey team based on FAO Stat, FMARD APS, etc.

Assumption of yield increase by product items is shown in the table below.

Table 2-16 Table Assumption of yield increase by product items

Category	Product items	Assumption of yield increase	Current unit yields (ton/ha): (a)	Improved unit yield (ton/ha): (b)	(b)/(a)
Cereal	All other than wheat	Assumed improvement to the average of other neighbor countries. However, for maize, sorghum, and plantain, the current situation is maintained because Nigeria exceeds the average of the other countries. The current state of maize is based on FAO STAT data, and the target is the current value of APS unit yield.	rice (1.93), maize (2.12), sorghum (1.18), yam (8.54), cassava (6.94), millet (0.96), cocoyam (3.94), plantain (14.94), potatoes (3.81), soybeans (0.93)	rice (2.5), maize (2.32), sorghum (1.2), yam (10.9), cassava (11.4), millet (1.0), cocoyam (4.69), plantain (15.0), potatoes (13.4), soybeans (1.1)	rice (1.3), maize (1.1), sorghum (1.0), yam (1.3), cassava (1.6), millet (1.0), cocoyam (1.2), plantain (1.0), potatoes (3.5), soybeans (1.2)
	Wheat	The same level as the current rice yield in Nigeria was assumed.	1.13	2.0	1.8
Vegetables	All	Assumed improvement to the average of other neighbor countries.	cowpea (0.77), tomatoes (4.23), okra, etc. (1.28), orange (4.84)	cowpea (0.9), tomatoes (10.9), okra, etc. (14.3), orange (9.1)	cowpea (1.2), tomatoes (2.6), okra, etc. (11.2), orange (1.9)
	Sesame	As Nigeria's yield is ranked number one, a 15% increase is assumed as an effort target.	0.89	1.0	1.1
Crops for processing	Ginger	Assuming the average of the top two neighbor countries.	8.84	12.0	1.4
	Cotton	Assuming the highest yield ever achieved based on "Assessing the Profitability of Cotton Production in Ogun State, Nigeria".	1.26	1.5	1.2
	Oil palm	With reference to "Declining Yield of Oil Palm: A case study of Four Oil Palm Plantations in Nigeria and Cameroun"(African Journal Online, Nigeria Agricultural Journal, Vol 33), increased of yield from 2.5ton/ha to 3.0ton/ha is set under assumption of gradual replacement of old trees.	2.56	3.0	1.2
	Groundnuts	Current status is assumed since the product is mostly for domestic market, which is not so competitive as other crops for export.	1.08	1.08	1.0
	Cocoa	Assuming the average of the top four neighbor countries.	0.27	0.7	2.6
	Hibiscus	With reference to "Unlocking potentials of hibiscus flower, export" (The Guardian, 11 August 2019), since the standard yield is about twice the current yield, a double target is assumed.	0.61	1.22	2.0
	Cashew nuts	Assuming the average of the top four neighbor countries.	0.72	1.2	1.7
	Sugarcane	Since sugarcane, which is highly dependent on imports, has a large	17.10	40	2.3

Category	Product items	Assumption of yield increase	Current unit yields (ton/ha): (a)	Improved unit yield (ton/ha): (b)	(b)/(a)
		gap with other countries' averages, it is assumed that the gap with other neighbor countries' averages will be reduced to half.			
Aquaculture	Catfish	With reference to "Increasing Income Diversifying Diets and Empowering Women, Report of the scoping study" (WorldFish, 2021), the yield in the "concrete tank" is set as a target under assumption that investment is stimulated to replace "Earthen pond" by "concrete tank".	15.98	20.24	1.3
	Tilapia	With reference to "Cultured aquatic species fact sheets" (FAO, 2009), the target was assumed to be 8.0 ton/ha which is a higher end of the average yield of "6.0-8.0 ton/ha" under ideal rearing conditions.	6.89	8.0	1.2

Note: Comparisons with other countries are based on "Table 2-1 Comparison of Yield of major products with neighboring countries ". Other countries' averages are "Average excl, Nigeria" the averages in the same table.

Source: Created by the Survey team

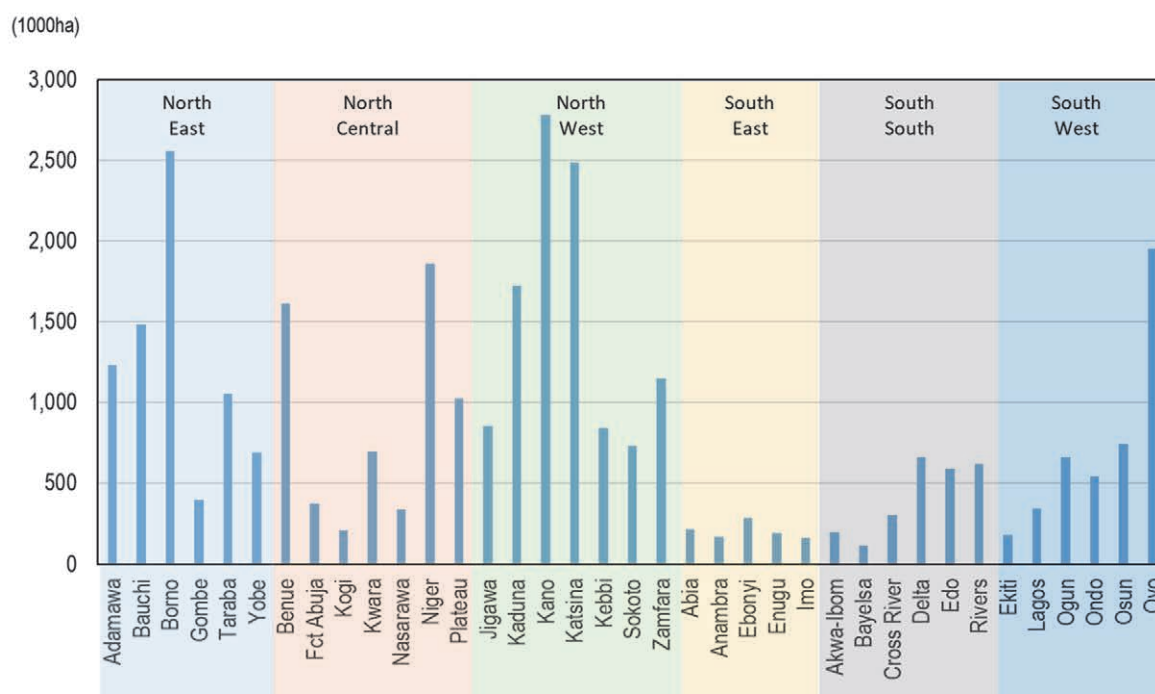
2.2 Status and Challenges of Agricultural Sector in Nigeria

2.2.1 Agricultural Production

(1) Land Use

Nigeria has 910,770 square kilometers land area⁶, of which approximately 77% (approximately 71 million ha) is cultivable land. The agricultural land area is 69,450 K ha, of which 35,000 K ha is arable land, 6,500,000 K ha is land under permanent crop, and 27,950 K ha is land under permanent meadows and pastures⁷. In NDP, increasing of arable land (from 34,000 K ha to 42,000 K ha) is set up as one of the KPI in order to build a sustainable food production system. Therefore it is expected that the arable land may be further increased in the future.

Distribution of cultivated land as shown in the figure below. It can be seen that cultivated land is larger in some states such as Kano, Borno, Katsina, Oyo, Niger, Kaduna, Benue and Bauchi.

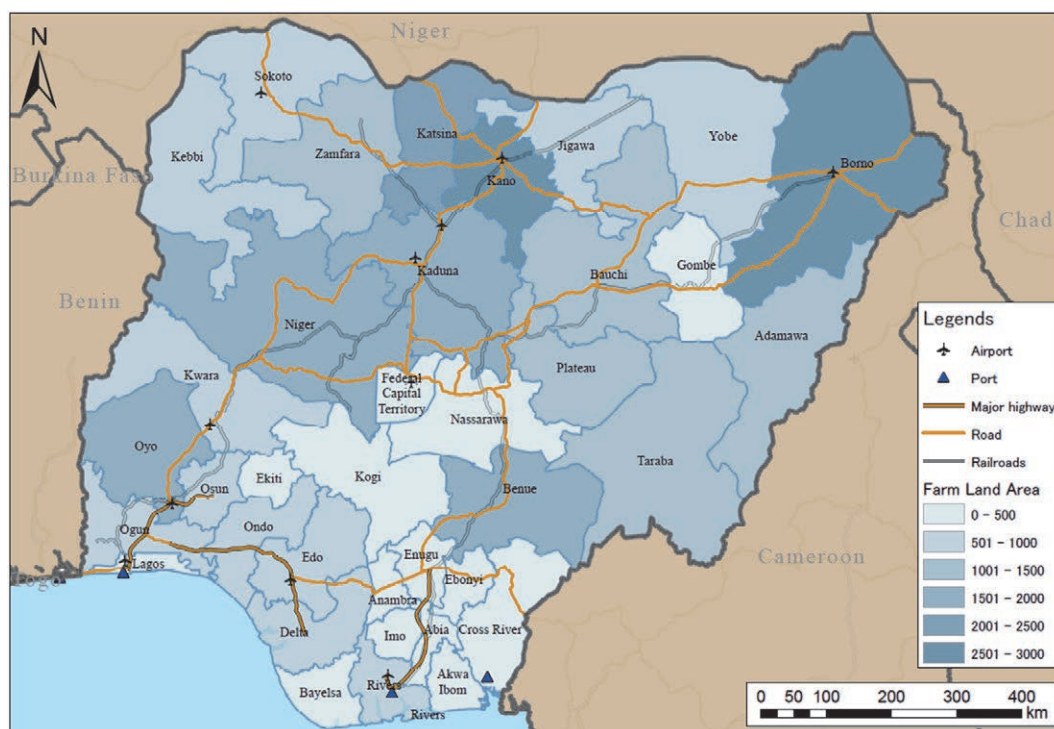


Source: National Agricultural Sample Survey 2010/2011

Figure 2-8 Cultivated area by state (1,000ha)

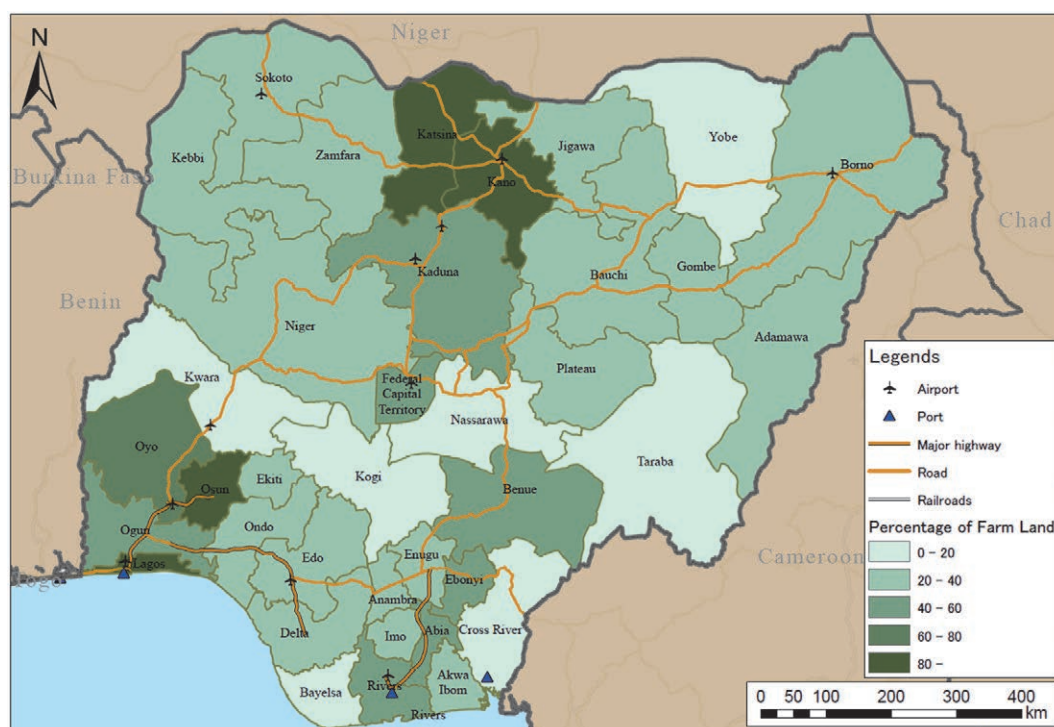
⁶ World development indicators (World Bank, 2020)

⁷ National Agricultural Sample Survey 2010/2011



Source: Made based on National Agricultural Sample Survey 2010/2011 by survey team

Figure 2-9 Cultivated area by state (1,000ha) (map)



Source: Made by survey team based on National Agricultural Sample Survey 2010/2011, ANNUAL ABSTRACT OF STATISTICS 2010

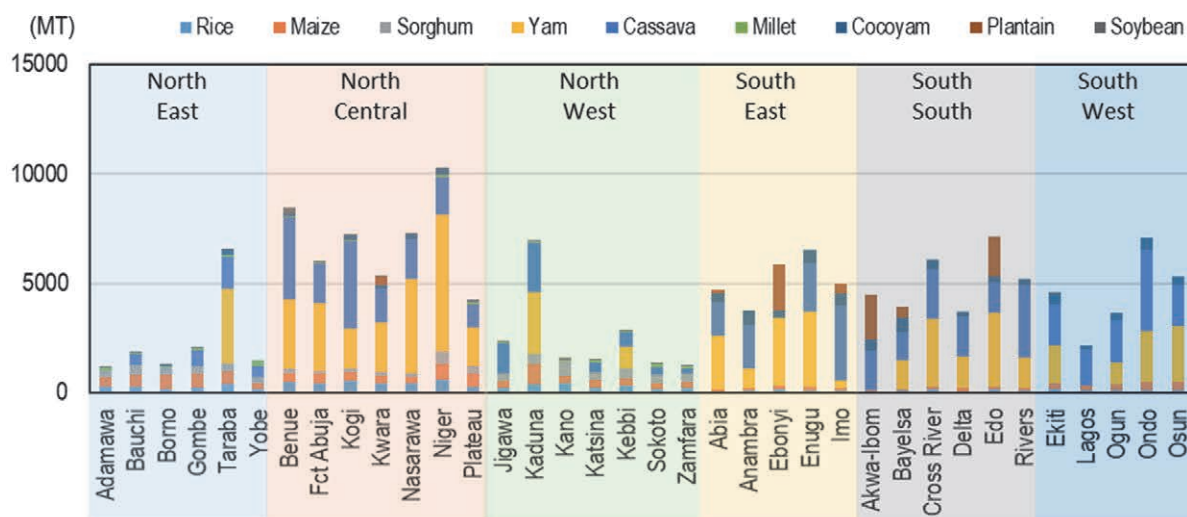
Figure 2-10 Percentage of cultivated area by state (map)

(2) Agricultural Production

Regarding the domestic agricultural production (2021), yam is the first place (59, 880 K tones), and cassava (58,240 K tones), maize (12,750 K tones), rice (8,340 K tones), cocoyam (8,200 K tones) are in place⁸. As for yam and cassava, Nigeria is the top producing country in the world. And maize is 15th place, rice is also 15th place, sorghum is 2nd place and ground nut is 4th place⁹.

Production amount by state is indicated as follows by 5 categories, cereals (rice, maize, sorghum, yam, cassava, millet, cocoyam, plantain, soy bean), vegetables (tomato, cowpea, okra), processing crop (sesame, ginger, ground nut, cotton), livestock (cow, sheep, goat, pig, chicken), aquaculture (catfish, tilapia) which are listed in APS.

For the cereals, Niger, Kogi and Edo state are the top 3 production state. For the vegetables; Kano, Taraba and FCT Abuja, for processing crops; Kaduna, Bauch and Benue state, for livestock; Zamfara, Kano and Katsina, for aquaculture; Bauch, Osun and Lagos, respectively.

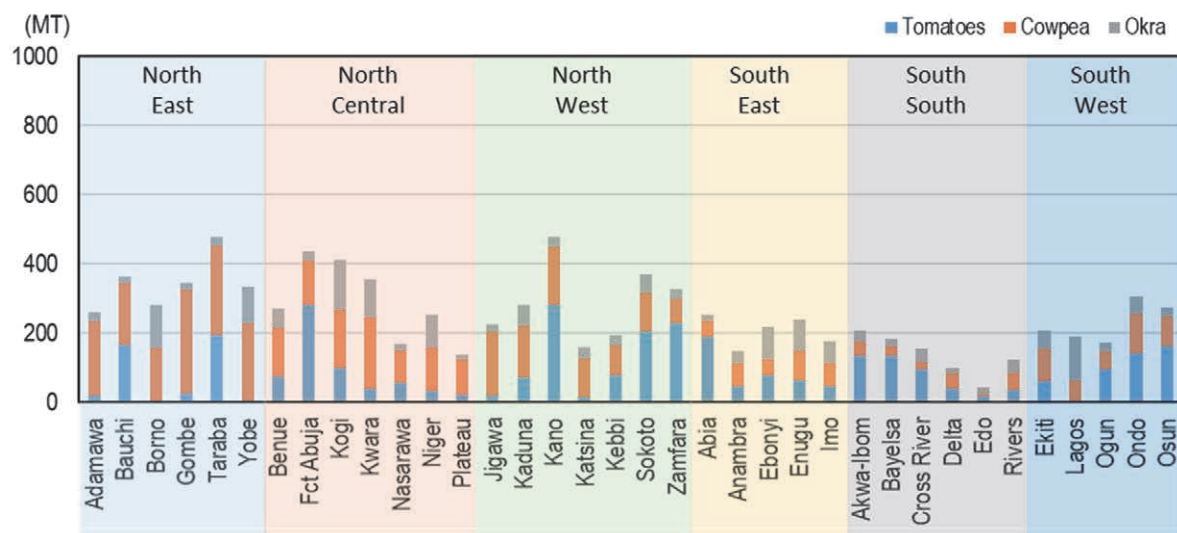


Source: National report of Wet Season Agricultural Performance in Nigeria 2021

Figure 2-11 Cereal production by state

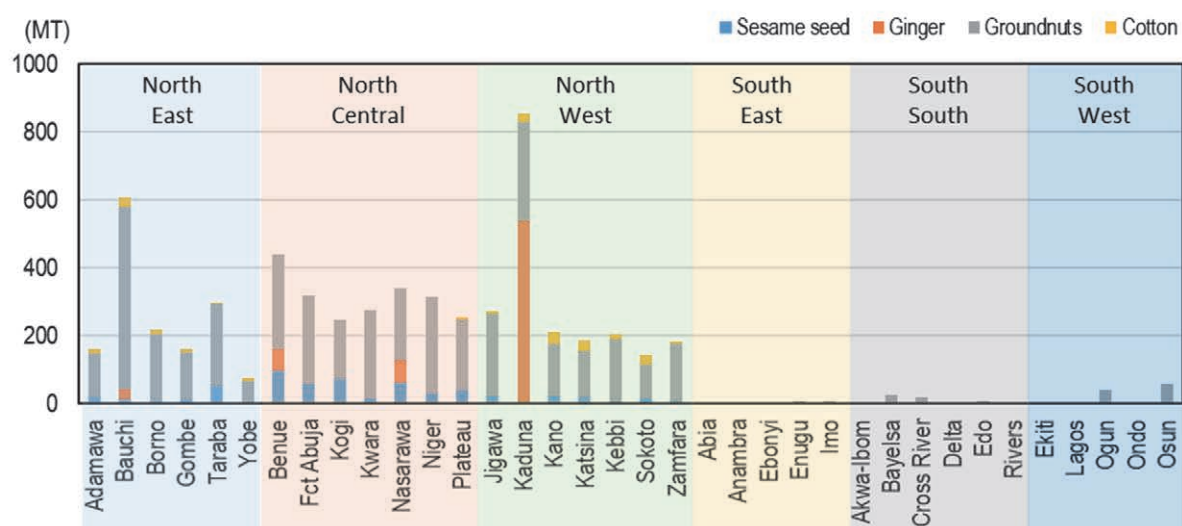
⁸ National report of Wet Season Agricultural Performance in Nigeria 2021

⁹ FAO STAT



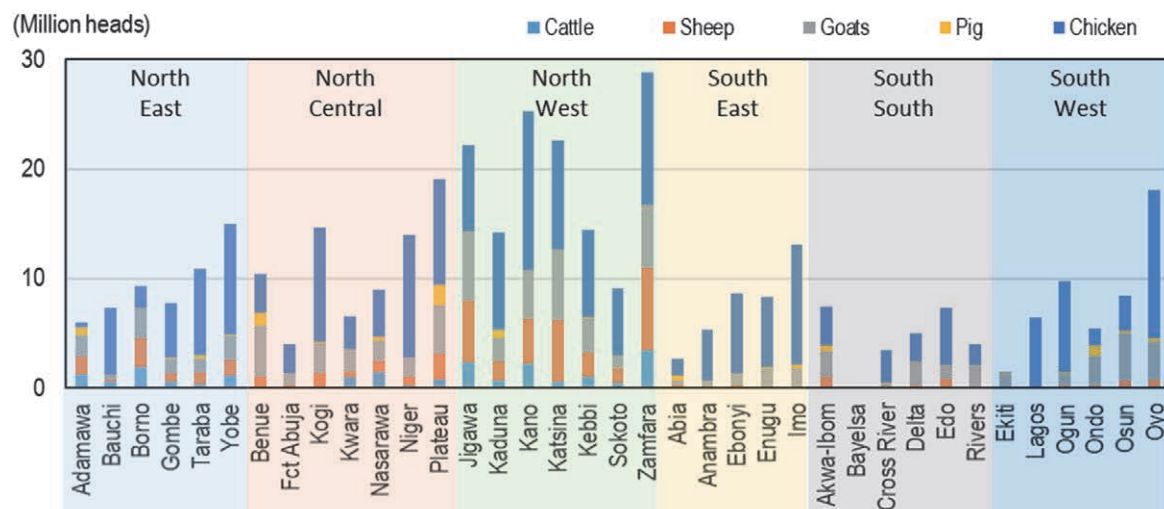
Source: National report of Wet Season Agricultural Performance in Nigeria 2021

Figure 2-12 Vegetable production by state



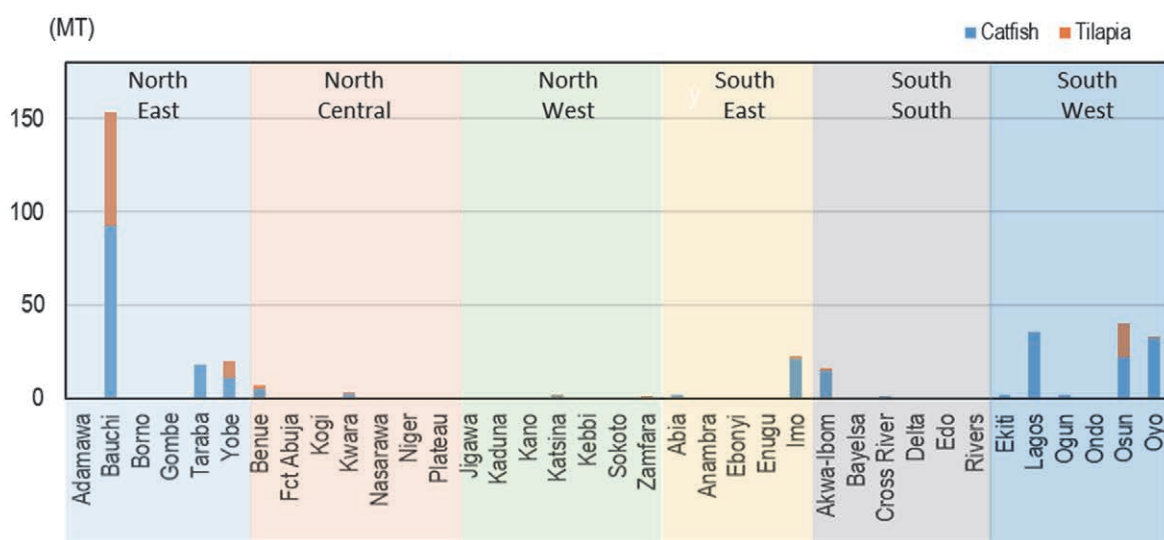
Source: National report of Wet Season Agricultural Performance in Nigeria 2021

Figure 2-13 Processing crops production by state



Source: National report of Wet Season Agricultural Performance in Nigeria 2021

Figure 2-14 Fig Livestock production by state



Source: National report of Wet Season Agricultural Performance in Nigeria 2021

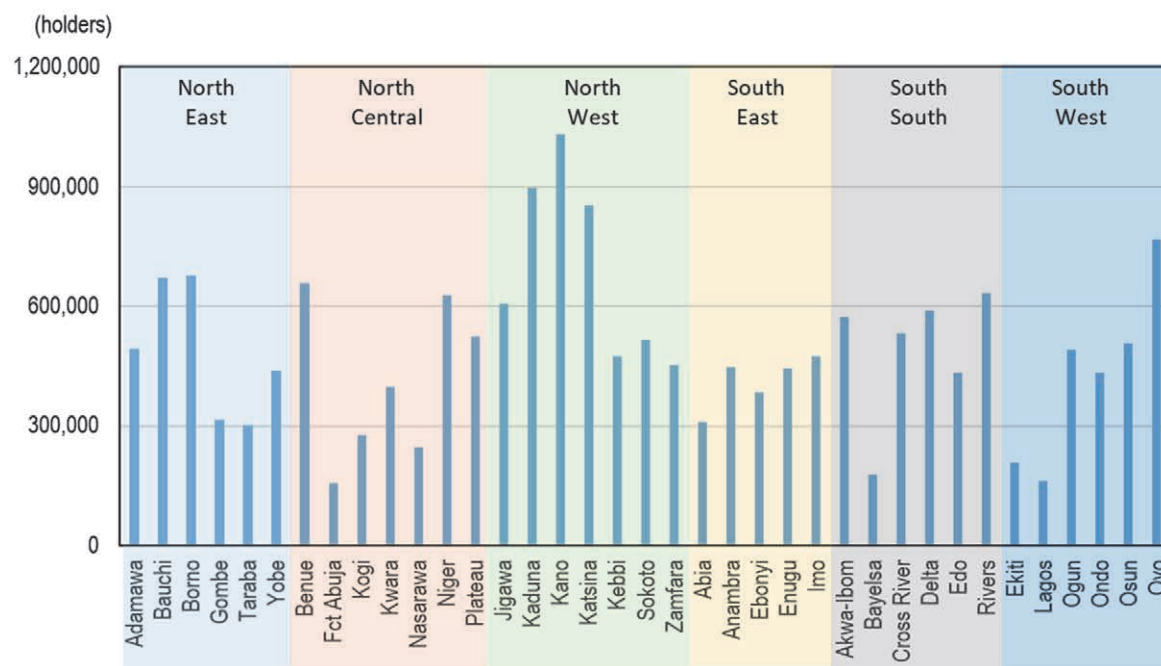
Figure 2-15 Aquaculture production by state

(3) Farmers

The total population of Nigeria exceeds 213 million¹⁰, and more than 70% of them are said to be engaged in agriculture-related sectors¹¹. The number of crop farmers is reported to be about 18.17 million. As for the distribution by state, especially Kano, Kaduna, Katsina, Oyo have a large number of farmers.

¹⁰ FAO STAT

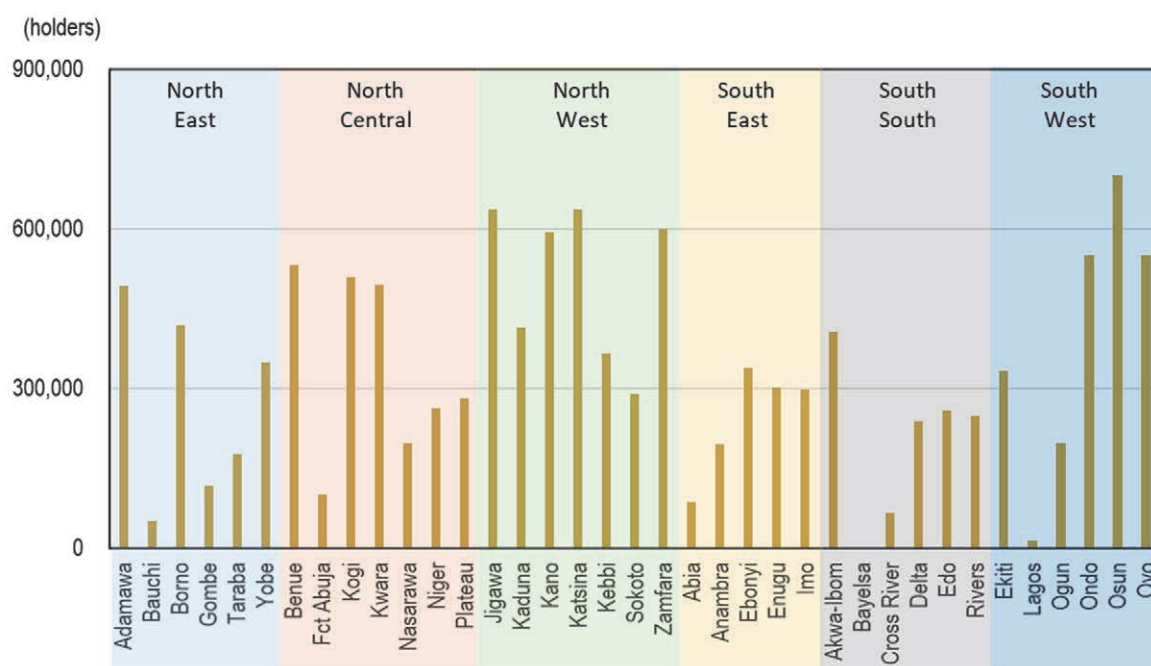
¹¹ <https://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/> (FAO, Nigeria at a glance)



Source: National Agricultural Sample Survey 2010/2011

Figure 2-16 Number of crop farmers (holders)

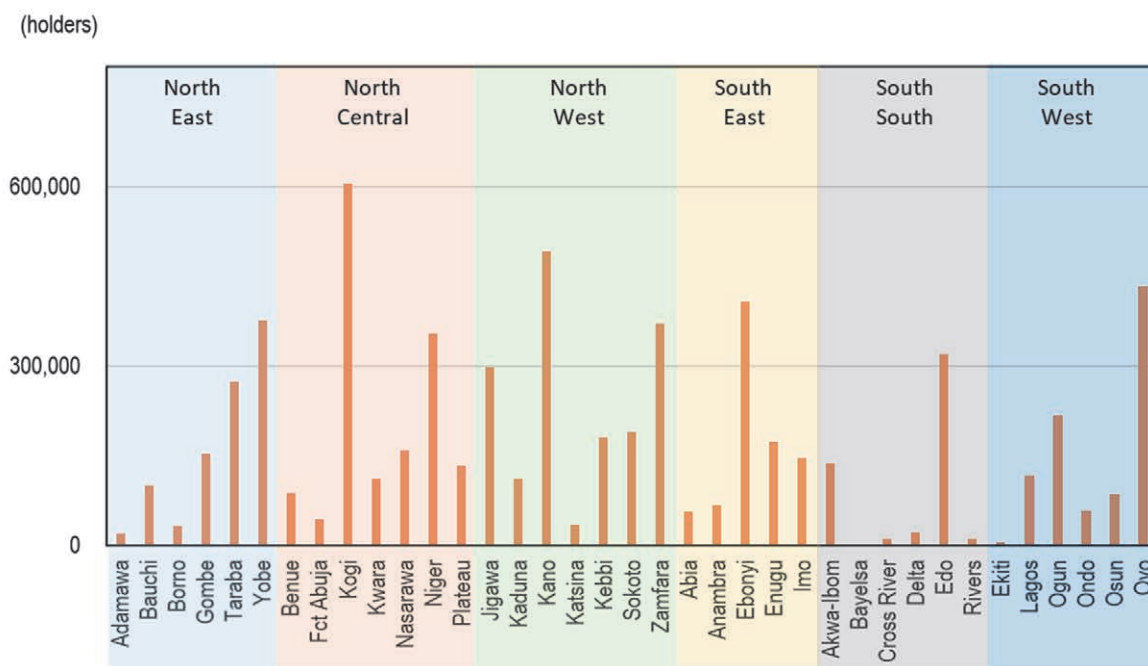
The number of livestock farmers is reported to be approximately 12.3 million, and 6.39 million is for poultry farmers and 1.02 million is for fishery farmers respectively¹².



Source: National Agricultural Sample Survey 2010/2011

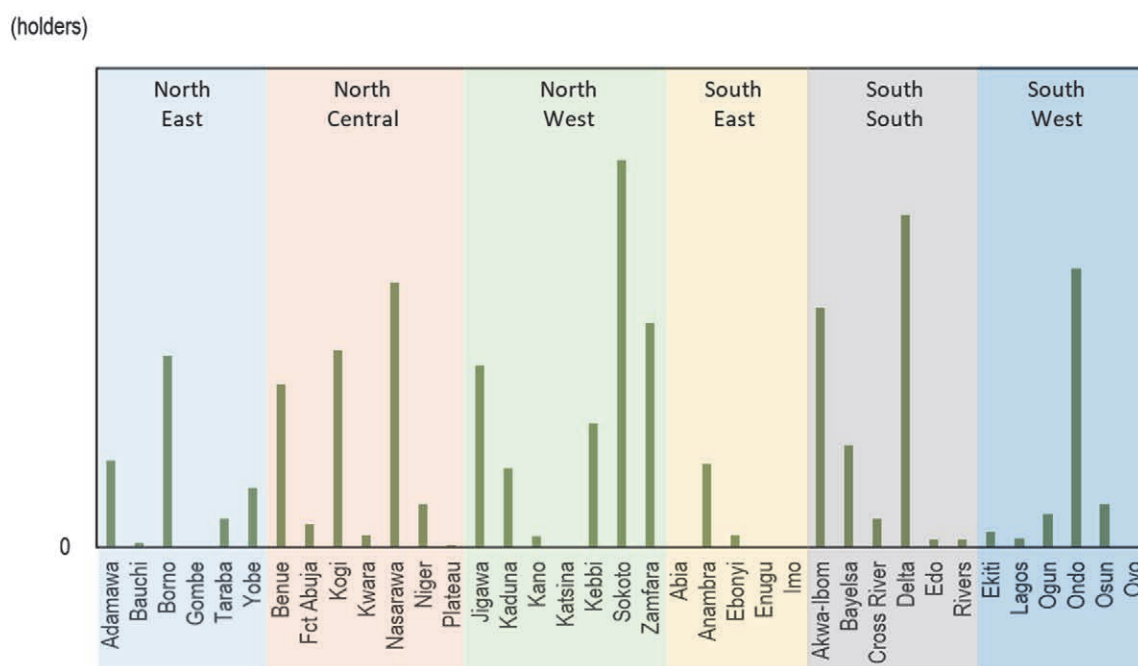
Figure 2-17 Number of livestock farmers (holders)

¹² National Agricultural Sample Survey 2010/2011



Source: National Agricultural Sample Survey 2010/2011

Figure 2-18 Number of Poultry farmers (holders)



Source: National Agricultural Sample Survey 2010/2011

Figure 2-19 Number of fishery farmers (holders)

In Nigeria, more than 80% of farmers are said to be “Small farmer” (Farmers conventionally classified as Small farmer: cultivating less than 5 ha, Medium farmer: cultivating among 5 ha and 10 ha, Large farmer: cultivating more than 10 ha in Nigeria)¹³.

In the following table, farmers are classified into Marginal farms (< 1ha), Small farms (1-2 ha), Semi-

¹³ National Survey and Segmentation of Smallholder Households in Nigeria

medium (2-4 ha), Medium (4-10 ha), Large (> 10ha). It shows the average size of farm land (ha), total holdings ratio (%), area ratio (%), and irrigated area ratio (%). In Nigeria, farmers who cultivate less than 5.0 ha¹⁴ account for a large part of the total.

Table 2-17 Ratio of farmland size by category

Category	Size (ha)	Average size (ha)	Total holdings (%)	Area (%)	Irrigated area (%)
Marginal farms	< 1	0.23	56	23	0.3
Small farms	1 - 2	1.42	24	36	2.2
Semi-medium	2 - 4	2.69	11	21	21.8
Medium	4 - 10	4.87	6	11	33.7
Large	> 10	13.51	3	9	42.2
All farms		2.25	100	100	100.0

Source: Tenacity of small farms and poverty levels: Evidence of relationship among farming households in Nigeria (2019, Apata)

(4) Farmland Tenure and Use

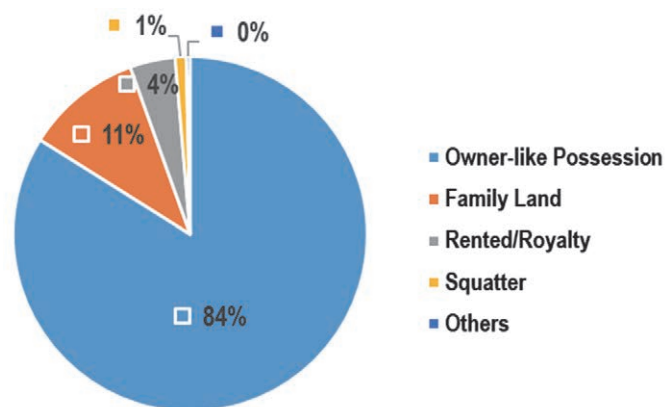
As for the ownership of farmland in Nigeria, 84% of farmland is cultivated based on owner-like possession (including the farmland cultivated by farmers who were given the farmland from their ancestors for some generations), 11% is farmland leased from family or relatives, 4% of farmland is leased from third party or the cultivator pays royalties, and 1% is farmland that is illegally cultivated (cultivated without approval of the owner of right of occupancy).

According to Nigeria's Land Use Act (1978), land in urban areas is mainly owned by state governments, while land in rural areas can be owned by local governments. State government and local government can grant the right (the case of state government: Statutory Right of Occupancy, the case of local government: Customary Right of Occupancy) (lease period is 99 years, automatically renewed at the end of the term¹⁵) to possess land to residents aged 21 or over, and farmers who have been continued farming in the area for the generations can carry out farming by applying to the government (This document includes Certificate of Occupancy and Deed of Assignment etc.).

On the other hand, acquisition by small farmers of the right does not proceed well because of following reasons, 1) Farmers are not aware of the application system for the right, 2) Application procedures for the right are not well standardized, 3) It takes a lot of time and effort to apply it. Although the actual analytical data is not clarified, according to the result of Socio-economic survey conducted by the team, the number of farmers who have the right of occupancy is 12 out of 70 (17%). The percentage of each state is, 0% (0/40) in Benue state, 0% (0/10) in FCT, 100% (10/10) in Nasarawa state and 20% (2/10) in Ondo state. It can be said that the rate of possession varies greatly in state by state and farmers' group by farmers' group.

¹⁴ National Agriculture and Food security strategy (NAFSS) 2010-2020

¹⁵ <https://www.nipic.gov.ng/> (Nigeria Investment Promotion Commission)



Source: National Agricultural Sample Survey 2010/2011

Figure 2-20 Status of farmland

In Nigerian agricultural sector, one of the big challenge is the limitation of farmers' financial access by not obtaining loans from financial institutions using their farmland as a collateral. Although it is possible to obtain loans from financial institutions with farmland as a collateral, borrowing from financial institutions is not progressing because of above mentioned reasons such as 1) Farmers are not aware of the application system for the right, 2) Application procedures for the right are not well standardized, 3) It takes a lot of time and effort to apply it.

(5) Agricultural Extension System

In Nigeria, there are many actors in agricultural extension service such as Federal government, state governments, private companies, international aid agencies and NGOs.

1) Federal Government and State Government

ADP (Agricultural Development Programme) is the most representative program which is under the jurisdiction of the FDAE (Federal Department of Agricultural extension) of FMAFS. The system of ADP was developed by World Bank in the 1980s. There are ADP offices set up in each state and managed and operated by each state government. ADP mainly conducts training and visits (T&V) and distributes materials (seeds and fertilizers), and the target farmers are limited to small and medium sized farmers with a less than 10 ha farmland.

The management system of ADP (e.g. training content and budget, etc.) differs from state by state, but in general, the shortage of budgets, extension workers and transportation (transportation expenses, motorcycles, fuel, etc.) have been problems.

For example, in the Nasarawa State ADP, which the survey team interviewed on June 5, 2023, the following statements were confirmed.

- Previously, N 2 million/month was allocated as ADP budget by the state government, but now it has been decreased to about a quarter.

- Currently, 117 extension workers are working in Nasarawa State ADP, but the shortage of extension workers is a big problem. Now, one extension worker is in charge of 14,000 to 15,000 farmers, but ideally they hope to increase the number extension workers to a level about 1,000 farmers per one extension worker.

Also, in the interview with Kwara State ADP on June 16, 2023, the following statements were confirmed.

- Currently, 88 extension workers are working. Each extension worker is in charge of more than 10,000 farmers, and ideally, like the Nasarawa State ADP, they would like to improve to a level about 1,000 farmers per one extension worker.

FDAE, which has jurisdiction over ADP, implements Farmer Field Schools (FFS) and Farmer Business Schools (FBS) and activities to strengthen the capacity of ADP officials in each state. In addition, it manages the annual general meeting of the Research-Extension-Farmer-Input Linkage System (REFILS), which was established to utilize the research results of research institutes for extension service and farmers. It contributes to share the local farming issues and research results, and spread farming techniques based on them.

Recently, National Farmer Helpline Centers (NFHCs) were developed in each geopolitical zone, and farmers are able to get an advisory service related to agricultural technical issue by experts directly. In addition to that, FDAE provides an E-extension service in digital platforms which are provided by Farm Monitor (<https://farmmonitor.africa/>) and Aglane (<https://aglaneng.com/>)¹⁶.

However, due to the lack of budget for managing REFILS, operating NFHCs and subscribing digital platform services, FDAE is not providing enough and sustainable service to farmers and stakeholders.

¹⁶ Interview to FDAE on November 2023

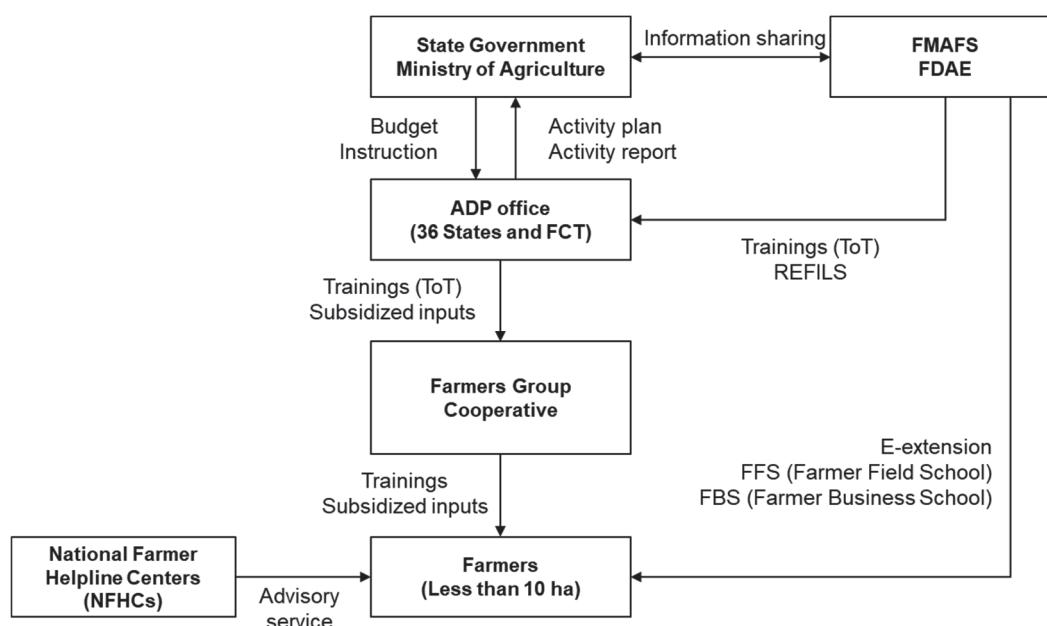


Figure 2-21 Agricultural extension structure by Federal and state government

2) Private Company

Private companies are also conducting their own extension services for the purpose of following up with farmers who use their products and services, and promoting the farmers to incorporate them into the commercial area in the future.

For example, Olam supports 35,000 farmers to improve yields and livelihoods through its own support program called Rice Out-grower Programme¹⁷, and Vertex Agro conducts technical training called Extension Support Services in Kogi State¹⁸. In addition, according to an agricultural input material retailer interviewed by the survey team in Lafia, Nasarawa State, farmers who purchased the products from the retailer were instructed on usage of products by phone calling, if necessary.

Start-Up companies also contribute to agricultural exertion. For example, AFEX is monitoring farmers' production activities and supporting farmers' group to be organized. Farmz2U is providing profitable information to farmers via their own platform. Other SUs such as ThriveAgric and Alluvial Agriculture, provide training and services to strengthen farmers who use their product and services. Details are described in "2.5 Digital Technology Applications and Startups in Agricultural Value Chain".

3) International Aid Agency

Agricultural extension programs by international aid agencies, similar to JICA's SHEP project, are also being implemented in various states. For example, in IFAD-VCDP, there is the project components

¹⁷ <https://www.olamgroup.com/locations/africa/nigeria.html> (July 27, 2023 accessed)

¹⁸ <https://www.vertexagro ltd.com/post/vertex-agro-extending-support-to-cashew-farmers-in-kogi-state> (July 27, 2023 accessed)

“Support to smallholder production”, and extension activities are carried out by the project¹⁹.

Many of the agricultural technical extension services such as ADP are operated relying on funds from donor agencies, and there are only few number of organizations that can operate with their own funds or subsidies from state governments. In particular, the shortage of transportation expenses, communication expenses, training implementation expenses and extension workers, is said to be main challenges and due to these challenges, appropriate extension services are not conducted²⁰.

(6) Research and Development (Breeding, Seed Production, Farming Technology)

1) Breeding

There are some research institutes such as the National Cereal Research Institute (NCRI) and the National Root Crop Research Institute (NRCR), which conduct research on varieties and farming methods. In these research institute, breeding for new variety is being conducted with local varieties and imported varieties based on the Seed Preference Survey conducted with National Agricultural Seed Council (NASC)²¹.

Main challenge is that research for new variety is not conducted enough due to the lack of facilities and equipment for research, and new variety satisfying with local demand is not developed²².

2) Seed Production

In Nigeria, there are three seed production schemes, namely Informal, Semi-formal and Formal Seed Production Scheme.

Informal Seed Production Scheme is the scheme that farmers produce their seed for next season by themselves and its quality is low. On the other hand, Semi-formal and Formal Seed Production Scheme are the schemes regulated by National Agricultural Seeds Decree (1992) and National Seed Rules and Regulations (2009). In these schemes, research institute and NASC develop new varieties, and research institute produce Breeder Seed (BS), and research institute and certified private company produce Foundation Seed (FS), and certified private company and certified seed production cooperative produce Certified Seed (CS). In this scheme, NASC monitors every step based on the OECD protocol²³. According to the web site of NASC, 314 private companies are registered as certified company²⁴.

Main challenges are 1) Low capacity of certified Seed Production Cooperatives, 2) Lacking budget of NASC, 3) Spread of fake seed due to disorder of monitoring function of NASC, 4) Less understanding on the importance of using semi-formal or formal seed by farmers. In the distribution and sales steps,

¹⁹ IFAD Value chain development programme supervision report (November 25, 2021)

²⁰ Nigeria: In-depth Assessment of Extension and Advisory Services (The U.S. Governments Global Hunger & Food Security Initiative, 2017)

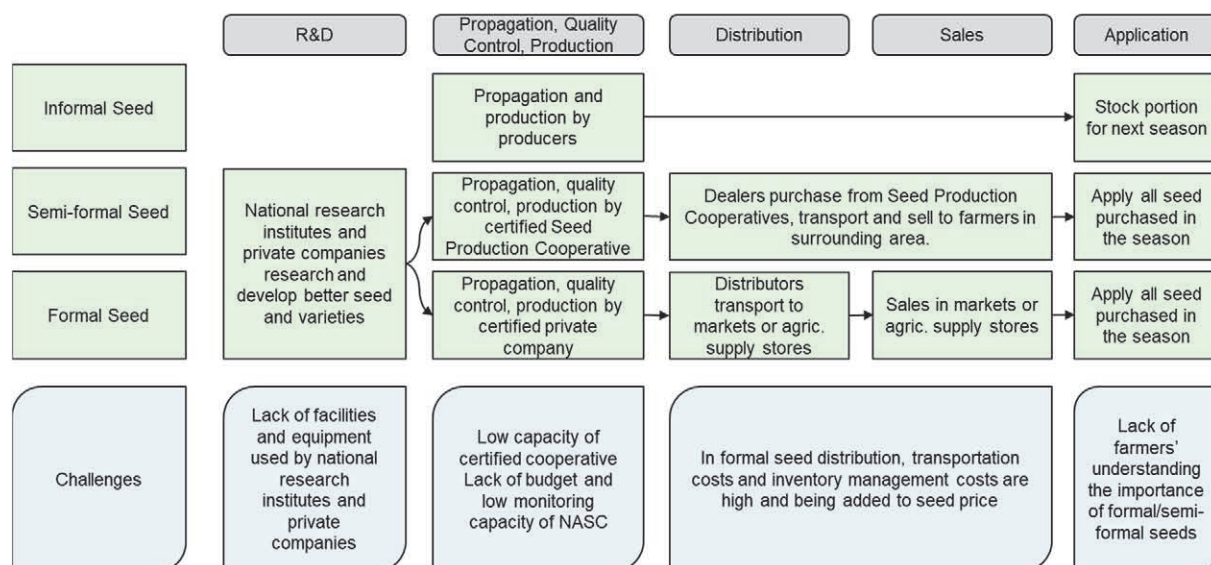
²¹ Hearing from NASC (November 203)

²² RICE SEED DEVELOPMENT STRATEGY OF NIGERIA 2014

²³ RICE SEED DEVELOPMENT STRATEGY OF NIGERIA 2014

²⁴ <https://seedcouncil.gov.ng/> (accessesed on 7th December, 2023)

high transportation cost pushes up the cost of seed.



Source: Survey team edited the chart based on National Agricultural Seed Policy for Nigeria 2022, Rice Seed Development Strategy of Nigeria 2014, Interview with NASC (Nov. 2023)

Figure 2-22 Flow chart of seed production in Nigeria

3) Farming Technology

Farming technology is researched and improved in the agricultural institutes (mainly ones belong to National Agricultural Research Institute (NARIS)) listed below. The Research-Extension-Farmer-Input Linkage System (REFILS) is a system established to improve the productivity of farmers, and they have been disseminating research result of research institutes to farmers through ADP extension workers²⁵. However, REFILS has also been unable to fully function due to a lack of operating funds after the end of the World Bank's support²⁶. According to interview with the FDAE by the survey team, a general meeting is currently held once a year, where ADP staffs and research institute staffs share local farming issues and research results. If it could be held more than once a year and more participants could attend, more detailed information shared and monitoring could be carried out more frequently, it could be more effective.

Table 2-18 List of agricultural research institutes in Nigeria

Type	Name of Organization	Location
Research Institutes	Veterinary Council of Nigeria	Abuja
	Nigeria Institute of Animal Science	Abuja
	Nigeria Institute of Soil Science	Abuja
	National Agricultural Land Development Authority	Abuja
	Agricultural Research Council of Nigeria	Abuja
	National Cereal Research Institute*	Niger
	National Root Crop Research Institute*	Abia
	National Institute for Fresh Fisheries Research*	New Bussa

²⁵ A Review of Agricultural Intervention Programs and their Extension Delivery System in Nigeria (Malabe et al, 2019)

²⁶ AN OVERVIEW OF 30 YEARS OF THE RESEARCH-EXTENSION-FARMER-INPUTS LINKAGE SYSTEM (REFILS) IN NIGERIA. (Arokoyo, 2019)

	Nigerian Store Product Research Institute*	Ilorin
	National Veterinary Research Institute*	Vom
	National Institute of Oceanography and Marine Research*	Lagos
	Nigerian Institute for Oil Palm Research	Benin*
	Nigerian Stored Products Research Institutes	Ilorin
	Lake Chad Research Institute*	Maiduguri
	Institute for Agricultural Research*	Zaria
	Institute of Agricultural Research and Training*	Ibadan
	National Horticultural Research Institute*	Ibadan
	Cocoa Research Institute of Nigeria*	Ibadan
	National Agricultural Extension Research Liaison Services*	Zaria
	National Animal Production Research Institute*	Zaria
	Rubber Research Institute of Nigeria*	Benin

Source: Created by ST from FMARD Web site

* shows institutions belonging to NARIS

(7) Agricultural Machinery

In Nigeria, agricultural machinery such as tractors, disc plows, disc harrows, and ridge raisers (ridgers) are mainly used. Since most of them are two-wheel drive, these machineries are used in upland fields and dry irrigated land²⁷. John Deere, Massey Ferguson, New Holland, Mahindra, Farmtrack, CASE and Sonalika are popular manufactures in the country. These machineries are often owned by farmers, cooperatives or companies of a certain size or above, and other farmers use the agricultural machinery services described later. The usage rate of tractors in Nigeria is said to be still less than 10%²⁸, and many small and medium-sized farmers carry out their work manually or by animal power. It is estimated that there are currently approximately 7,000 tractors in Nigeria, but the number is not enough considering the area of agricultural land in the country. Delays in agricultural work due to the lack of agricultural machinery are leading to low yields. On the other hand, for many small-sized farmers employed by large-sized farmers, contracted agricultural work is an important source of income for them.

Threshing machines and rice milling machines are also used as post-harvest machinery. In some cases, farmers themselves own these machines and process and sell products with added value after harvest, while in other cases, rice milling companies and cooperatives own them and process products in a large scale.

In Nigeria, the Agricultural Mechanics and Machinery Operators Training Center (AMMOTRAC) under FMAFS and the National Center for Agricultural Mechanization (NCAM) were established in order to promote agricultural mechanization. The followings are brief overview of these organization²⁹.

AMMOTRAC

AMMOTRAC is in charge of capacity building for mechanics and operators of agricultural machinery

²⁷ AFICAT report

²⁸ National Rice Development Strategy II 2020-2023

²⁹ AFICAT report

in the country, with two centers in Misau, Bauchi state and in Akure, Ondo state. The center in Misau will be in charge of 19 states in the northern part of the country, while the one in Akure will be in charge of 17 states in the south. A training was conducted in the center of Akure for 35 university students in 2020.

NCAM

NCAM is an organization that promotes agricultural mechanization. It researches for the development of domestically produced machinery for farming and processing, develops designs for easy and low-cost machinery that can be manufactured domestically, standardizes and certifies agricultural machinery and other equipment with the Standards Organization of Nigeria (SON), supports commercialization of agricultural machinery and other equipment, provides information on methods and programs for promoting mechanization, develops human resources through training and seminars for mechanization, and plays a major role in collaboration with other domestic and overseas organizations. The headquarters is located in Ilorin, Kwara State, and zonal offices were established in Akure, Ondo State, in Samaru, Kaduna State and in Umudike, Abia State.

In addition to the above organizations, the expansion of services and the formation of an ecosystem of agricultural machinery service providers (described below) will be important to enable small-scale farmers to access agricultural machinery. The formation of an ecosystem is expected to improve farmers' access to agricultural machinery and lower usage fees. Overviews of the main agricultural machinery service providers are below.

TOHFAN

Tractor Owners and Hiring Facilities Association of Nigeria (TOHFAN) is an organization that provides farmers with agricultural machinery services with 568 tractors and various machineries owned by machinery owners (investors). The machinery owners outsource everything (from maintenance to operation) to TOHFAN, and receive a portion of sale of the machinery service. In other words, the machinery owners are positioned as investors in the business. TOHFAN is responsible for daily maintenance and inspection, while the owners are responsible for repair costs in case of a breakdown of the machinery. TOHFAN also provides advice on the selection of machinery for investors who are not familiar with agricultural machineries. In addition, TOHFAN guarantees the quality of its operators by awarding operator certificates to tractor operators who have learned to operate and maintain the tractors.

Investors who purchase tractors can pay their investment in about three years.

Hello Tractor

Hello Tractor provides a matching service (a matching platform) that connects machinery owners with farmers. POS agents and agricultural extension officers act as Booking Agents on the Hello Tractor platform and connect owners who want to provide machinery services with farmers. Booking Agents can earn 5% of the machinery service fee if the matching complete successfully.

As the other business, Hello Tractor provides the Tractor Finance Scheme that Hello Tractor purchases tractors and then leases and sells them to farmers. Loans of commercial banks usually require an annual interest rate of 20 to 25% and a down payment of about 30%, while Hello Tractor sells the specialized devices and allocates 500 ha of farmland for lease with an annual interest rate of 14% and a down payment of 5%.

According to an interview with Hello Tractor, the scheme would allow investors for repayment in approximately five years.

Interviews with each stakeholder indicate that demand for agricultural machinery certainly exists. Hello Tractor estimates that demand for about 50,000 tractors exists in Nigeria, and they are considering purchasing about 2,000 tractors in the next two years. Standage Inc. is also importing used combines from Japan and piloting a rental service, and confirming that demands for combines surely exist.

On the other hand, the lack of tractor operators and mechanics, and access to spare parts are the main problems. It is important to introduce trainings and certification system for operators and mechanics, and establish a system to supply spare parts.

Currently, agricultural machineries manufactured by Japanese companies are not disseminated. According to interviews with farmers in Nasarawa state, they own a rice mill machinery manufactured by Kubota Corporation, but they have never seen tractors or other agricultural machineries manufactured by Japanese companies. In addition, according to an interview with Mitsubishi Corporation, Japanese used agricultural machinery lacks horsepower and is not suitable for hard soil in Nigeria. If Japanese companies wish to expand their business into Nigeria, it might be important for them to supply machineries and spare parts which are suitable for hard soil.

(8) Agricultural Subsidies and Loans

A variety of agricultural subsidies and financing schemes and programs exist in Nigeria.

The Presidential Fertilizer Initiative (PFI) is implemented by former President Buhari since 2016 with the aim of supporting domestic fertilizer companies and enabling farmers to purchase fertilizer at low price. In recent years, fertilizer subsidies have been reported to account for 68% of federal agriculture-related expenditures³⁰, so that fertilizers accounts for a large share of agriculture-related subsidies.

It is reported that N1.2 billion in subsidies were distributed by the federal government through each agricultural co-operative to 2.2 million farmers³¹.

The ADP in Nasarawa State, which was visited by survey team, distributed one bag of fertilizer to each of 25 farmer groups last year. While the ADP in Kwara State distributed approximately 400 bags

³⁰ Fertilizer subsidies, political influence and local food prices in sub-Saharan Africa: Evidence from Nigeria (Takeshima and Liverpool-Tasie, 2013)

³¹ <https://punchng.com/fg-plans-n12-3bn-subsidy-for-two-million-farmers/>

of maize seeds and fertilizer to farmers. It seems that such subsidies at the state level are carried out irregularly in each state based on the budget. However, it doesn't seem that proper distribution is being carried out based on the actual situation of farmers. It is said that subsidies are distributed uniformly regardless of the farmland area and scale of farmers.

In terms of financing subsidies, there are some schemes such as the Agricultural Credit Guarantee Scheme (ACGS), which is a guarantee system for loans to agriculture-related businesses established by CBN, the Commercial Agriculture Credit Scheme (CACs), which provides credit facilities to agriculture-related companies, and Credit Risk Guarantee (CRG), which is provided by Nigeria Incentive-based Risk-sharing System for Agricultural Lending (NIRSAL) to reduce the risk of agricultural lending.

In particular, the Anchor Borrowers Programme (ABP), which started in 2016, is the country's largest financing scheme (at the same time, it also serves as an agricultural extension service). This program was established with the aim of increasing rice and wheat production, and facilitates linkages between co-operatives and buyers or off-takers, training through ADP offices and easy access to agricultural inputs and credits for farmers. The details of ABP and other financial scheme are described in 2.4.4 Agricultural finance.

(9) Human Resource Development

Regarding human resource development in agriculture, education is being carried out at Colleges of Agriculture and Universities of Agriculture shown below. It has been pointed out that these agricultural education programs do not reflect the current situation in the agricultural sector in the curriculum, and making it difficult for students to be ready to work immediately after graduation and work in companies³².

Table 2-19 List of agricultural academic institutes in Nigeria

Type	Name of Organization	Location
Colleges of Agriculture	Federal College of Agriculture, Akure	Ondo State
	Federal College of Agriculture, Dadinkowa	Gombe State
	Federal College of Agriculture, Ibadan	Oyo State
	Federal College of Agriculture, Ishiagu	Ebonyi State
	Federal College of Animal Health and Production Technology, Ibadan	Oyo State
	Federal College of Animal Health and Production Technology, Vom	Plateau State
	Federal College of Fisheries and Marine Technology	Lagos
	Federal College of Freshwater Fisheries Technology, Baga	Borno State
	Federal College of Forestry Mechanization, Afaka	Kaduna State
	Federal College of Land Resources Technology, Kuru, Jos	Plateau State
	Federal College of Land Resources Technology, Owerri	Imo State
	Federal College of Wildlife Management, New Bussa	Niger State
	Federal College of Forestry, Ibadan	Oyo State
	Federal College of Forestry, Jos	Plateau State

³² Curriculum Design in an Agricultural Education Program in Nigeria: Towards Advancing Career Readiness (Ajao et al, 2022)

Universities of Agriculture	Samaru College of Agriculture (DAC), Zaria	Kaduna State
	College of Agriculture (DAC), Kabba	Kogi State
	Federal University of Agriculture	Abeokuta
	University of Agriculture	Makurdi
	Michael Okpara University of Agriculture	Umudike

Source: Created by the survey team based on FMAFS HP

(10) Support Measures and Programs

Below is a list of support measures and programs for farmers related to agricultural technology dissemination, research and development, and subsidies.

Table 2-20 List of support measures and programs in Nigeria

Support measures and programs	Organization	Target	Overview
Agricultural Development Programme (ADP)	FDAE, State Government	Nationwide	Provision of agricultural materials, guidance to extension workers, training to farmers, introduction of new credit marketing services, provision of improved seeds and small-scale infrastructure.
Research-Extension-Farmer-Input Linkage System (REFILS)	FDAE, ADP office	Nationwide	A conference organized to improve the productivity of farmers, it disseminates the research results, technologies, and agricultural materials of research institutes and private companies to farmers through extension workers of ADP.
Presidential Fertilizer Initiative (PFI)	Federal Government	Nationwide (fertilizer)	Implemented to protect domestic fertilizer companies and increase farmers' productivity by phasing out the import of fertilizers and making it possible for domestic fertilizer companies to purchase fertilizer raw materials at low prices ³³ .
Anchor Borrowers Programme (ABP)	CBN	Nationwide	Established and implemented by the federal government and ABP to link farmers and financial institutions and enable financial access.
Agricultural Credit Guarantee Scheme (ACGS)	CBN	Nationwide (credit guarantee)	A credit guarantee system established by CBN that initially guaranteed up to 75% of loans to agricultural businesses by commercial banks. The loan is now 100% guaranteed ³⁴ .
Commercial Agriculture Credit Scheme (CACS)	CBN, Federal Government, FMAFS	Nationwide (credit facility)	It was established with the aim of enhancing national food security by increasing food production and lowering food price in Nigeria. It aims to grow the agricultural sector by providing credit facilities to agriculture-related companies ³⁵ .
State governments' temporary subsidy	Kwara State government	Kwara state (Maize)	Temporary assistance provided by the Kwara State Government. Maize seeds and

³³ AFICAT survey report (October, 2022)

³⁴ Impact of Credit Policy on Paddy Area in Nigeria (Abdulsalam et al, 2021)

³⁵ Impact of Credit Policy on Paddy Area in Nigeria (Abdulsalam et al, 2021)

programme			fertilizers were distributed to farmers ³⁶ .
	Jigawa State government	Jigawa state (Machinery)	At the time of purchasing a tractor, if farmers pay a 25% upfront payment and 5% of the selling price as operating expenses, they can pay in installments without interest ³⁷ .
	Nasarawa State government	Nasarawa state (Credit)	Loans for registered cooperatives by Ministry of Commerce, Industry and Investment ³⁸ .

Source: Survey team

The status and implications on the support measures and programs for the farmers and agriculture-related enterprises in Nigeria are compiled in the following table.

Table 2-21 Status and implications on the support measures and programs

Support measures and programs	Status and implications
Agricultural Development Programme (ADP)	Budget: The ADP office applies for the next year's extension activity plan and necessary budget to the state government, and then it is allocated. The budget amounts often depend on the governor's interest in agriculture, in the most cases the amount is enough. Role and implementation system: In addition to agricultural technology extension activities to farmers, distribution of agricultural materials (including subsidies) is carried out through ADP extension officers. ADP extension officers carry out activities through Visits and Training method. One extension officer may be in charge of more than 10,000 farmers. Problems: Shortage of extension officers and activity budget due to lack of funds. Implications: It is important to increase the budget and make it sustainably, but it is also important to carry out extension activities efficiently with a limited budget. It is necessary to build a digitalized system that can grasp the information and status of farmers in timely, and supply training and materials based the situation.
Research-Extension-Farmer-Input Linkage System (REFILS)	Budget: REFILS is hosted by the FDAE. Due to the limited budget, it is currently held only once a year, although the original goal is to hold it about four times a year for more detailed information exchange and frequently monitoring. Role and implementation system: Farmers, research institutes, agricultural input material dealers, and ADP extension officers gather from six geopolitical zones to exchange research results and information on new products that contribute to resolve problems in actual farming. Problems: Limited the number of meetings due to lack of funds. Implication: For more detailed information exchange and frequently monitoring, in addition to face-to-face meetings, it is necessary to hold online meetings and build a digitalized platform that make all stakeholders to exchange information in timely.
Presidential Fertilizer Initiative (PFI)	Funding: It is funded by the Federal Ministry of Finance, Budget and National Planning (FMFBNP) and CBN. Role and implementation system: Nigeria Sovereign Investment Authority (NSIA) is responsible for importing, storing, and distributing the raw materials to fertilizer producers, while the Fertilizers Producers and Suppliers Association of Nigeria (FEPSAN) is responsible for distributing fertilizers.

³⁶ Interview with Ministry of Agriculture and Natural Resources and ADP in Kwara State

³⁷ AFICAT survey report (October, 2022)

³⁸ Interview with Ministry of Commerce, Industry and Investment in Nasarawa state

	• Problems: While PFI has enabled producers to produce fertilizer at a low cost, due to undeveloped supply chains and poor infrastructure, farmers still have to pay two to three times the price of fertilizer³⁹. • Implications: Improvements in logistics and infrastructure that contribute to improving the purchase price of materials for farmers and the shipping price of products is a major problem.
Anchor Borrowers Programme (ABP)	Details are described in 2.4.4 Agricultural finance.
Agricultural Credit Guarantee Scheme (ACGS)	<u>Details are described in 2.4.4 Agricultural finance.</u>
Commercial Agriculture Credit Scheme (CACS)	<u>Details are described in 2.4.4 Agricultural finance.</u>
State governments' temporary subsidy programs	• Budget: It is temporary implemented when the budget for subsidies is secured or when the budget for agricultural promotion is surplus. • Role and Implementation system: Agricultural input materials which are subsidized by government are distributed to farmers in the state through local agricultural material stores and ADP extension officers. • Problem: Due to the lack of timely basic information of farmers and their farming conditions, it is not possible to distribute the required amount at the required time. • Implications: It is necessary to build a digitalized system that can grasp the information and status of farmers in timely, and supply subsidized materials based their situation.

Source: Survey team

(11) Challenges and Direction for Improvement in Agricultural Sector

Based on the current situation regarding farming in Nigeria compiled as above, the challenges and directions for improvement, and related proposed cooperation policy are shown below.

Table 2-22 Challenges in farming in Nigeria and direction for improvement

Challenges of farming in Nigeria		Direction for improvement
Topic	Contents	
Acquisition of right of occupancy and its putting up as collateral	Applications for rights of occupancy are not progressed because farmers are not aware of the system of rights of occupancy, the application procedures are complicated, and the application process requires a lot of time and labor. In addition to that, farmers are not aware of the procedures for collateral putting up, and the high cost of the procedure prevent farmers from borrowing from financial institutions.	Provide technical guidance and financial literacy support to farmers, and also support for revisions to the legal system and mechanisms.
Budget of agricultural extension system	ADP offices often rely on funds from international aid agencies to operate and provide necessary trainings to farmers. They are sometime unable to adequately pay the salaries for extension officers, transportation and communication costs.	In addition to institutional reformation to obtain budgets and strengthen the administrative capacity of each ADP office, a knowledge base should be developed to improve the efficiency of extension activities and to support the implementation of training based on farmers' demand.

³⁹ A Historical Review of Fertilizer Policies in Nigeria (Balana and Fasorati, 2022)

Capacity of R&D institutions and seed production cooperatives	Research and development is not well conducted due to the lack of research facilities and equipment at NASC and research institutes listed in NARIS, and capacity of researchers.	Provide facilities and equipment necessary for the research and development, and capacity building of researchers. As for seed production, strengthen the operational and monitoring capacity of NASC and provide technical assistance to seed production cooperatives to prevent the spread of fake and poor quality seed.
Ecosystem for agricultural machinery	A lack of tractor operators and mechanics, and limited access to spare parts make it difficult for agricultural machinery to be introduced in Nigeria.	By providing low-interest and long-term loans through TSL, investors, farmers and cooperatives will be encouraged to invest in agricultural machinery. Provide capacity building for tractor operators and mechanics, and develop a certification system.
Information of farmers	State ministry of agriculture (including ADP office) and cooperative ministries have not been able to obtain timely and accurate information, including the farming conditions of farmers and cooperatives. Therefore, they have not been able to provide trainings efficiently and distribute subsidies and agricultural inputs.	Establish a farmers' database in order to obtain farmers' information timely and provide necessary trainings and inputs appropriately so that extension activities and subsidy distribution can be conducted more efficiently and effectively.
Human resource development	The current situation in the agricultural sector is not reflected in the curricula of educational institutions, and it makes difficult for graduates to work in companies or other businesses immediately after graduation.	Provide education to students based on the knowledge base mentioned "Budget of agricultural extension system" and promote to develop the certification system mentioned "Ecosystem for agricultural machinery" for being active workers in the agricultural sector immediately after graduation.

Source: Survey team

2.2.2 Farmers' organization/cooperatives

(1) Current situation of cooperatives⁴⁰

Concerning the current situation of cooperatives, overall structure, number of cooperatives, number of member farmers, organization ratio, and examples of cooperatives at the state level are described.

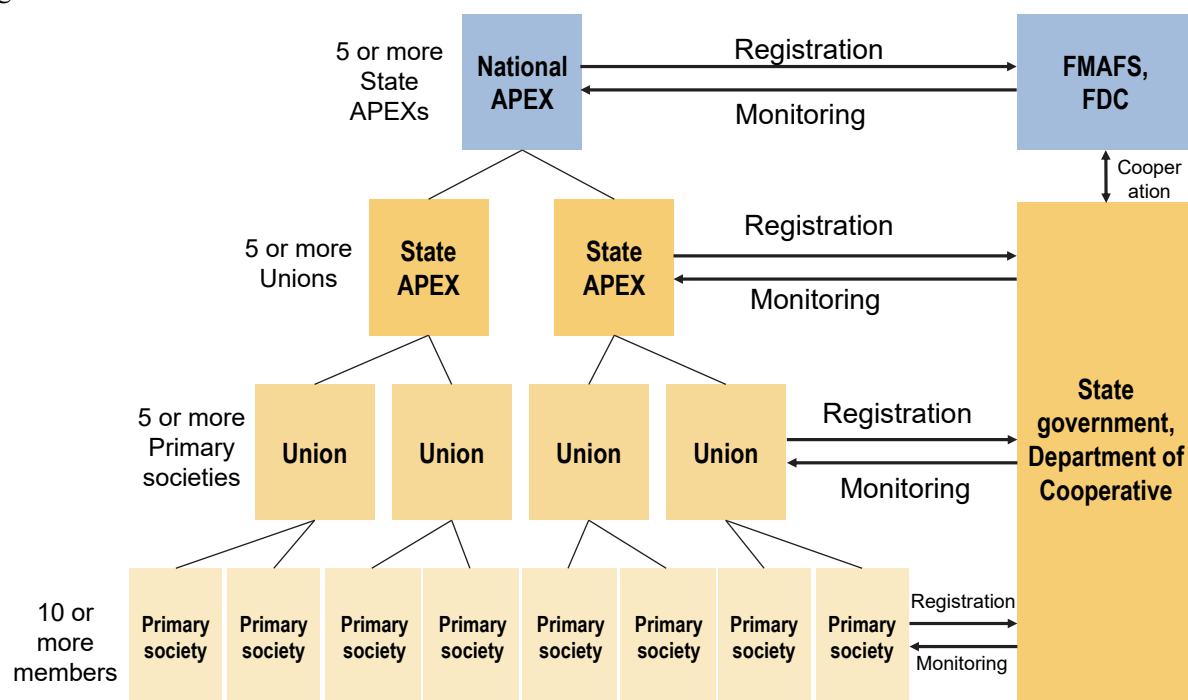
1) Overall structure

The Nigerian cooperative system has a four-tier structure consisting of Primary societies (10 or more members), Unions (LGA level, 5 or more Primary societies), State APEX⁴¹ (state level, 5 or more Unions), and National APEX (federal level, 5 or more State APEXs). National APEX is registered with

⁴⁰ Although there are other types of farmers' organizations such as association in addition to cooperative, this report describes cooperative. Association is established under the Companies and Allied Matters Act and is required to register with the Corporate Affairs Commission (CAC). Unlike cooperative, association can solicit investments from outside investors.

⁴¹ APEX system is a system that has a hierarchical structure, in Japan for example, from the unit agricultural cooperative, the prefectural level one to the national level one, and a cooperative system between lower level organizations and higher level ones in terms of information sharing and support systems.

the federal government, while State APEX, Unions, and Primary societies are registered with the State government⁴².



Source: Created by the Survey team

Figure 2-23 Structure of the cooperative system

2) Number of cooperatives, Number of member farmers, Organization ratio

Currently, 27 National APEX are registered with the federal government, of which only 10 National APEX are actually active. Of these, two National APEX are in the agricultural sector and one National APEX is in the fisheries sector⁴³. The number of cooperatives and member farmers in the three APEXs is 795,000 Primary societies (7,965,000 farmers) in the agricultural sector and 12,500 Primary societies (250,000 farmers) in the aquaculture sector, respectively⁴⁴. Divided by the number of crop farmers (about 18,170,000 farmers) and the number of aquaculture farmers (fishery and aquaculture) (about 1,020,000 farmers) in Nigeria⁴⁵, the organization ratios are about 44% and 25% in the agricultural and fishery sectors, respectively. The National Rice Development Strategy II (NRDS II)⁴⁶ elaborated by the former Federal Ministry of Agriculture and Rural Development (now the Federal Ministry of Agriculture and Food Security) also points to a 30% of organization ratio in the rice sector. In any case, it is clear that the organization ratio in Nigeria is low.

⁴² Hearing from FDC

⁴³ Hearing from FDC

⁴⁴ Hearing from National APEX in the agricultural sector (National APEX of Nigeria Farmers' Cooperative Society Limited (NANFACOS), National Agricultural Cooperative Organization Ltd (NACO), and one in the aquaculture sector (Fisheries Cooperative Federation of Nigeria Ltd (FCFNL))

⁴⁵ National Agricultural Sample Survey 2010/2011

⁴⁶ Federal Ministry of Agriculture and Rural Development: National Rice Development Strategy II (2020–2030)

Table 2-23 Number of cooperatives, Number of member farmers, Organization ratio in agricultural and aquaculture sectors

Name of National APEX	Fisheries Cooperative Federation of Nigeria Ltd (FCFNL)	National Agricultural Cooperative Organization Ltd (NACO)	National Apex of Nigeria Farmers' Cooperative Society Limited (NANFACOS)
Sector	Aquaculture	Agriculture	Agriculture
Number of State APEX	37 organizations (36 States + FCT)	37 organizations (36 States + FCT)	37 organizations (36 States + FCT)
Number of Union	500 organizations	150 organizations	780 organizations
Number of Primary society	12,500 organizations	15,000 organizations	780,000 organizations
Number of member farmer	250,000 farmers	165,000 farmers	7,800,000 farmers
Total number of farmer on each sector	About 1,020,000 farmers	About 18,170,000 farmers	
Organization Ratio	25%	44%	

Source: Created by the Survey team

3) Examples of cooperatives at the State level

During the field survey, the survey team interviewed five Primary societies. Summary of interviews is described below as examples of cooperatives.

- Business activity

All of the Primary societies produce more than one product, thereby diversifying risk. In addition to crop production, some of the Primary societies diversify their business by processing crops and buying crops from other Primary societies.

- APEX Structure

None of the Primary societies are affiliated with a union, and the respondents indicated that the reason for this is that any union does not exist in the area where their Primary societies are located, or they do not know of any union at their area.

- Challenge

The challenges faced by the Primary societies can be broadly divided into production, marketing, finance, and others, and are extensive as follows.

- Production: rising material costs due to inflation, lack of tractors and operators, lack of irrigation equipment for vegetable cultivation, crop damage due to disease and pests
- Sales: lack of infrastructure, lack of buyers, sales prices determined by buyers
- Finance: lack of funds for activities
- Other: Insecurity (physical safety aspects) issues, climate change

- Experience with bank loans

Only one of the five cooperatives has received bank loans through the Commercial Agriculture Credit Scheme (CACS)

- Status of support

Three of the five Primary societies received support from the State government, mainly through training provided by the Agricultural Development Program (ADP), monitoring by ADP extension workers, provision of agricultural inputs, and business advice. None of the Primary societies is members of a Union, so they did not receive any support from the Union, nor did they receive any support from agricultural enterprises/SUs.

Table 2-24 Examples of cooperative (Primary society)

Name of Primary society		National Farmers Group & Cooperative Society (NFGCS)	OWANBE FARM	Offa meta ikolaba poultry association	Sual multipurpose cooperative society	Balasu young farmers association
Basic information	Location	Nasarawa	Oyo	Oyo	Abuja	Abuja
	Produce	• Livestock: Cattle, Sheep, Goat, Poultry, Aquaculture • Crop: Rice, Soybean, Maize, etc. • Processing: Rice milling, Wheat milling	• Aquaculture • Tomato • Chili pepper	• Poultry (Egg) • Poultry (Live Chicken) • Cassava • Maize	• Tomato • Cassava • Maize	• Tomato (Rainy season, Dry season) • Yam (Rainy season) • Maize (Rainy season, Dry season)
APEX structure	Type of business	Multi-purpose (Production + Processing)	Production	Production	Multi-purpose (Production + Aggregation)	Production
	Number of member	• 17 communities • 10,000 farmers	20 farmers	More than 15 farmers	20 farmers	35 farmers
	Joining a Union	Not join	Not join	Not join	Not join	Not join
Support to member	Reason for not joining		Unions have not developed in areas where Primary societies exist.			Any member does not know any unions operating in the area where Primary societies exist.
	Support in agricultural sector	• Provision of training	• Introduction of buyers • Savings • Provision of business advice • Share of water pump	• Production of feed for chicken and distribution of it to members • Breeding advice • Veterinary Advice	• Collective sales of crops • Support for calculation of revenue • Share of water pump	• Provision of business advice • Collective sales of crops • Collective purchase of inputs

Name of Primary society		National Farmers Group & Cooperative Society (NFGCS)	OWANBE FARM	Offa meta ikolaba poultry association	Sual multipurpose cooperative society	Balasu young farmers association
	Loan to member		Not available	Not available	Available	Not available
Support from Union	Support in agricultural sector	Not joining any Union	Not joining any Union	Not joining any Union	Not joining any Union	Not joining any Union
Support from State government	Loan from Union	Not joining any Union	Not joining any Union	Not joining any Union	Not joining any Union	Not joining any Union
	Support in agricultural sector	No support	No support	No support	• Training for farming • Provision of inputs (Fertilizer, Pesticide, Seed) • Monitoring by ADP extension worker	• Training conducted by ADP • Provision of business advice
Support from agricultural company/SU	Loan from State government	Not available	Not available	Not available	Not available	Not available
	Support in agricultural sector	No support	No support	No support	No support	No support
Challenges that Primary societies face	Loan from agricultural company/SU	Not available	Not available	Not available	Not available	Not available
		1) Lack of finance 2) Insecurity 3) Lack of infrastructure (Road, Electricity, Water, etc.)	1) Transportation takes time and cost due to bad condition of road 2) Lack of finance 3) Increase of input cost due to inflation 4) Insecurity 5) Due to the high cost of inputs, the price of fish is forced to raise	1) Increase of input cost due to increase of petrol price 2) Insecurity 3) No market 4) Sales price determined by buyer	1) Crop damage by insects 2) Irrigation facility for tomato 3) High price of fertilizer 4) Lack of tractor and operator	1) Lack of finance 2) Lack of irrigation facility (well and pump) 3) Damage to tomato by insects (Dry season) 4) Climate change 5) Outbreak of disease 6) Few buyers

Name of Primary society	National Farmers Group & Cooperative Society (NFGCS)	OWANBE FARM	Offa meta ikolaba poultry association	Sual multipurpose cooperative society	Balasu young farmers association
		and it cannot be sold in the market.			
Loan experience from bank	• Loan experience from Keystone bank through CACS		No loan experience	No loan experience	No loan experience

Source: Created by the Survey team

In addition, the Nasarawa State Government has compiled templates of by-laws for each type of business of Primary society (Group Farming Co-operative Society Limited, Multi-purpose Co-operative Society Limited, Farmers Credit and Marketing Co-operative Society Limited, Thrift and Loan Co-operative Society Limited) and distributed them to Primary society as necessary. The contents of each template are as follows:

- Contents about Primary society: Basic information about Primary society, Object, Division of society and Dissolution
- Contents about members: Membership, Powers and duties of the general meeting
- Contents about funds: Creation of funds, Shares
- Contents about support to members (finance): Loan to members, Savings by members
- Organizational structure: Committee, Secretary, other various committees
- Finances: Books and account, Disposal of profits, Reserve fund
- Other: Amendment of by-laws

(2) Comparison with successful practices of farmers' organization/cooperative in other countries

Farmers' organization/cooperatives in Japan, Indonesia, and the Philippines are functioning well. The structural elements of farmers' organization/cooperatives in these countries include legal status, organizational governance/management system, scope/scale of business, supervisory system, APEX system, and support provided by APEX. These elements are indicated in the table below.

Table 2-25 Components of cooperative in countries with well-functioning farmers' organization/cooperative

Structural elements	Japan	Indonesia	Philippines
Legal status	• Established under the Agricultural Cooperatives Law	• Established under the Cooperatives Law	• Established under the Cooperatives Law
Organizational governance/management system	• 1 member, 1 vote • Members contribute principal	• 1 member, 1 vote • Members contribute principal and purchase capital securities	• 1 member, 1 vote • Members contribute principal
Scope/scale of business	• Type of businesses are 1) sales of agricultural and livestock products, 2) purchasing of input materials, 3) credit business, 4) mutual aid business, 5) other businesses • Many unit agricultural cooperatives carry out multiple business	• Type of businesses are (1) production business, (2) retail business, (3) credit business, and (4) service business • Many unit cooperatives carry out multiple business	• Type of businesses are (1) production business, (2) retail business, (3) credit business, (4) service business, (5) sales business, and (6) other businesses. • Many unit cooperatives carry out multiple business

Supervisory system	<Agricultural business> Supervised by the Ministry of Agriculture, Forestry and Fisheries <Credit business> Supervised by the Financial Services Agency	<Agricultural business> Supervised by the Ministry of Cooperatives and SMEs <Credit business> Supervised by the Savings and Loan Cooperatives Supervision Agency	<Agricultural business> Supervised by Cooperative Development Authority <Credit business> Supervised by Cooperative Development Authority
APEX system	• Three-tiered structure (unit cooperatives, prefectural level, national level) • At the prefectural and national levels, organizations are organized for each business: economic business, credit business, and mutual aid business.	• Three-tiered structure (unit cooperatives, state level, national level) • Apart from the Ministry of Cooperatives and SMEs, higher level organizations supervise lower level organizations from the perspective of business collaboration • Lower level organizations submit annual reports and monthly fees to higher level organizations	• Three-tiered structure (unit cooperatives, federations, central union)
Support provided by APEX	• Sales at wholesale market • Price negotiations with input manufacturers	• Promoting partnerships with private companies • Expanding income opportunities through business development	• Implementation of training on management of cooperatives • Sharing market information and best practices on business

Source: Created by the Survey team

From the table above, the success factors for the development of farmers' organization/cooperatives can be summarized as follows.

- Legal status: Farmers' organization/cooperatives is firmly stipulated by law.
- Organizational governance/management system: Members have a voice by contributing principal, and participate in activities of cooperatives actively.
- Scope/scale of business: Business in a wide range of fields is permitted, and a unit cooperatives conduct multiple businesses. In particular, agricultural cooperatives also serve as credit cooperatives.
- Supervisory System: Supervision by ministries and laws is implemented.
- APEX system: Consisting of a three-tiered structure (unit cooperatives, prefectural/state levels, and national level), and higher level organizations support lower level organizations.
- Support provided by APEX: Support for activities that are difficult for unit cooperatives to implement on their own such as price negotiations with input manufacturers, promotion of partnerships with private companies, etc.

Next, by using the above success factors as a benchmark, the current situation in Nigeria is compared with it, based on the results of the interviews conducted in Nigeria. Then, shortcomings of the current

situation in Nigeria, identified through comparison, are summarized in the table below.

Table 2-26 Comparison of benchmark about farmer organization/cooperative with the current situation in Nigeria

Structural elements	Benchmark	Nigeria	Shortcomings compared to benchmarks
Legal status	Stipulated by law	Established under the Cooperative Law	Nothing
Organizational governance/management system	- Contributed by members - Members have a say - Active participation in activities of cooperatives by members	1 member, 1 vote - Contributed by members	No active participation in activities of cooperatives
Scope/scale of business	- Business in a wide range of fields. - Implementation of multiple businesses.	- Business content can be freely determined - Agricultural cooperatives, even if they aim to be a multi-purpose business, are often limited to the production sector.	Even if cooperatives aim at multiple businesses, it remains in the production field only.
supervisory system	Regulated by ministries and laws	FMARD supervises cooperatives at the federal level, and state governments supervise cooperatives at state level, unions, and unit cooperatives.	The state government cannot properly supervise cooperatives at state level, unions, and unit cooperatives because of a lack of budget and human resources.
APEX system	- Three-tiered structure. - Support of lower level organizations by higher level organizations.	Four-tiered structure (unit cooperatives, union, state level, federal level)	Higher level organization cannot provide enough service to lower level organizations.
Support provided by APEX	Support for activities that are difficult for unit cooperatives to implement on their own	Support for production, sales, and capacity development.	Support for financial issue is not enough.

Source: Created by the Survey team

- Organizational governance/management system: Compared to the benchmarks such as contribution of members, having a voice, and active participation in activities of cooperatives, in the current situation in Nigeria, active participation in activities of cooperatives is not enough.
- Scope/scale of business: Compared to the benchmarks such as business in a wide range of fields and implementation of multiple businesses, in current situation in Nigeria, although the content of business can be freely determined and many types of business are implemented, agricultural cooperatives are limited to activities in the field of production.
- Supervisory system : Compared to benchmark as regulation by ministries and laws, in the current situation in Nigeria, the State government cannot properly monitor State APEX, Unions, and Unit

cooperatives due to lack of budget and human resources.

- APEX system : Compared to benchmark as support from higher level organizations to lower level ones, in the current situation in Nigeria, enough service is not provided from higher level organization to lower level ones.
- Support provided by APEX : Compared to benchmark as support for activities that are difficult for unit cooperatives to implement on their own, in the current situation in Nigeria, support in financial issue is not enough.

(3) Problems and reasons of farmer' organization/cooperatives in Nigeria

Based on the background of the current situation described in the previous section, the low organization ratio in Nigeria (44% in agricultural sector and 25% in aquaculture sector) is a problem, which can be attributed to 1) lack of trust, 2) weak cooperative system, and 3) problem of the APEX system. These factors are described below.

1) Lack of trust

According to interviews with the FDC, state governments sometimes accept registrations of cooperatives that do not meet the necessary requirements in order to obtain cooperative registration fees. For example, although registration of union normally requires five or more unit cooperatives, there have been cases where registration as a union was accepted even if only three unit cooperatives had gathered. Such cases undermine the legitimacy and credibility of cooperatives, and lead to farmers not joining unit cooperatives.

As for 2) weak cooperative system, it can be divided into I) services provided by unit cooperatives to members and II) support provided by higher level organizations to lower level ones.

2) Weak cooperative system, I) services provided by unit cooperatives to members

Concerning services provided by unit cooperatives to their members, the following table compares information obtained from unit cooperatives during the field survey and information on services provided in countries where the cooperatives are functioning well.

Table 2-27 Comparison of Nigeria and other countries about services provided by unit cooperatives to their members

Service		Nigeria	Japan	Indonesia
Category	Contents			
Production	Collective purchase of inputs	○	○	○
	Share of agricultural machineries and materials	○	○	○
Sales	Collective sales of produce	○	○	○
Finance	Loan to members	△	○	○
	Provision of insurance service to members	×	○	×
Capacity Development	Training or Advice on farming	○	○	○

Note: ○: applicable, △: partially applicable, x: not applicable
Source: Created by the Survey team

In all of Nigeria, Japan, and Indonesia, services are provided by unit cooperatives to their members in production, sales, finance, and capacity development, but while loans to members are provided in Japan and Indonesia, they are rarely provided in Nigeria.

For members of unit cooperatives, access to loan in addition to production and sales services is important for sustaining production activities, but the lack of such services in Nigeria has prevented farmers from organizing because they do not identify the benefits of joining a cooperative.

2) Weak cooperative system, II) support provided by higher level organizations to lower level ones

Concerning support provided by higher level organizations to lower level ones, the following table compares information obtained from National APEX during the field survey and information on services provided in countries where the cooperatives are functioning well.

Table 2-28 Comparison of Nigeria and other countries about support provided by higher level organizations to lower level ones.

Service		Nigeria	Japan	Indonesia
Category	Contents			
Production	Collective purchase of inputs	○	○	○
	Collective purchase of agricultural machineries	○	○	○
Sales	Collective sales of produce	○	○	○
Finance	Loan to lower level organizations	△	○	○
Capacity Development	Training or Advice on farming	○	○	○

Note: ○: applicable, △: partially applicable
Source: Created by the Survey team

In all of Nigeria, Japan, and Indonesia, there is support from higher level organizations to lower level ones in production, sales, finance, and capacity development, but in Nigeria, support by higher level organizations in financial aspect is weaker than in the other countries. For example, in Japan, the Japan Agricultural Cooperatives (JA) provides loans and insurance, and, in Indonesia, there are moves to institutionalize savings guarantee about credit union, but no such moves have been seen in Nigeria.

Regarding monitoring by higher level organizations, there is a specialized department for supervision and monitoring in Indonesia, but according to FDC, in Nigeria, higher level organizations are not able to monitor the activities and financial status of lower level ones due to lack of capacity and human resources.

In a situation where the higher level organizations are unable to provide adequate support and proper monitoring, lower level organizations are forced to operate independently, and the scope and sustainability of their activities are limited, so farmers do not identify the benefits of joining cooperatives, and their organizing is not progressing.

3) Problem of the APEX system

According to interviews with FDCs, although lower level organizations are required to join higher level ones, there are cases where lower level ones do not belong to higher ones, and penalties for not joining are not stipulated in The Nigerian Co-operative Societies Act, Cap. N98, 2004. In addition, according to interviews with the Nasarawa State Ministry of Commerce, Industry, and Investment, out of the 1,000 unit cooperatives registered with the state government, half of them (500 unit cooperatives) are not actually functioning. The registration of non-functioning unit cooperatives should be revoked. However, the fact that this has not been done leads to a loss of trust and confidence in cooperatives and the APEX system. For example, in Indonesia, unit cooperatives are monitored on a regular basis and their registration is cancelled if they have not conducted any activity. In doing so, only unit cooperatives conducting actual activities will always remain on the list, thereby fostering trust and confidence.

(4) Direction of improvement and cooperation

1) Support to farmers by startup

For the reasons discussed in the previous section, organization ratio is low, and while the function of traditional cooperative through the APEX system is weak, it is a large frontier market. Therefore, startups are taking on the quasi cooperative function and developing in comparison to other countries.

A comparison of the number of farmers targeted by the major startups in Nigeria and neighboring countries as a percentage of the population is shown below.

Table 2-29 Number of farmers targeted by the major startups in Nigeria and neighboring countries as a percentage of the population

Name of country	Number of farmers targeted by the major startups (person)	Population (Year 2021) (person)	Number of farmers targeted by the major startups as percentage of population (%)
Kenya	2,590,500	53,005,614	4.89
Nigeria	6,269,935	213,401,323	2.94
Senegal	130,000	16,876,720	0.77
Ghana	140,000	32,833,031	0.43
Cote d'Ivoire	70,000	27,478,249	0.25
Zambia	22,000	19,473,125	0.11
Ethiopia	82,000	120,283,026	0.07
Madagascar	3,000	28,915,653	0.01

Source: Created by the Survey team, based on interview in the field survey, Final report of JICA project "Data Collection Survey on Agriculture Digitalization Platform in Africa (QCBS), 2021", and FAOSTAT.

In Nigeria, the number of farmers targeted by major startups as a percentage of the population is 2.94%, second only to Kenya's 4.89%. It is also 2% higher than Senegal, which has the third largest ratio, suggesting that startup is more developed in Nigeria than in other countries.

In addition, as the specific support provided by SU, there are moves to promote joint work and to support the promotion of capital accumulation that the payment of a portion of income is accumulated for purchasing agricultural machinery. For example, Standage, a start-up company at Lagos, is helping

to strengthen existing cooperatives, especially those of rice producers. Specifically, after confirming the farmland and production output of organized cooperatives, which include about 50 members, Standage provides farm machinery such as harvesters and tractors, and also provides training in utilization and maintenance about them. In addition to providing seeds and fertilizers to support production, Standage also connects farmers with rice millers to enable them to sell unhulled rice directly to the millers without a middleman. They also use tractors to provide an opportunity for all members of the cooperative to prepare the land together and confirm the benefits of working together. Furthermore, the profits obtained from the sold crops are returned to cooperatives not as cash, but as agricultural machineries and fertilizers in order to promote reinvestment and capital accumulation as cooperatives.

There are also moves to support the improvement of financial access by collaborating with financial institutions and Fintech companies. For example, Zowasel, an another start-up company at Lagos, calculates a score called the Alternative Credit Evaluation System (ACES) as credit information, divides farmers to 4 ranks (A, B, C, D) according to ACES, and shares it with the VFD Microfinance Bank. VFD Microfinance Bank provides loans with mutual guarantees by farmers according to each rank categorized by Zowasel, and SympliFi (Fintech company) provides credit guarantees.

If TSL provides funding to these startups and strengthens their activities, the benefits to farmers can be further enhanced.

2) Support for cooperatives by the federal government's digital platform for agriculture (The National Adopted Village for Smart Agriculture: NAVSA)

As noted above, while startups are being considered to support farmers, traditional cooperatives, which make up the majority of farmers, could be left behind in the competition. To avoid this, the National Adopted Village for Smart Agriculture (NAVSA) (For details, refer to “2.5.4 Federal and state government efforts to digitize VC”), a digital platform for agriculture developed by the National Information Technology Development Agency (NITDA), can be considered as a DX for traditional cooperatives and is conceivable that supporting it.

In addition to providing crop information (currently for Maize, Bean, Tomato, Cassava, and Rice) and farmland information (weather and soil), NAVSA offers payment functions through e-wallet (including procurement support) and may provide market information in the future. Also, it is expected that the target commodities will be expanded to include livestock, poultry, and aquaculture. NAVSA aims to develop infrastructure for all farmers, whereas private companies such as startups target cooperatives that can ensure business viability.

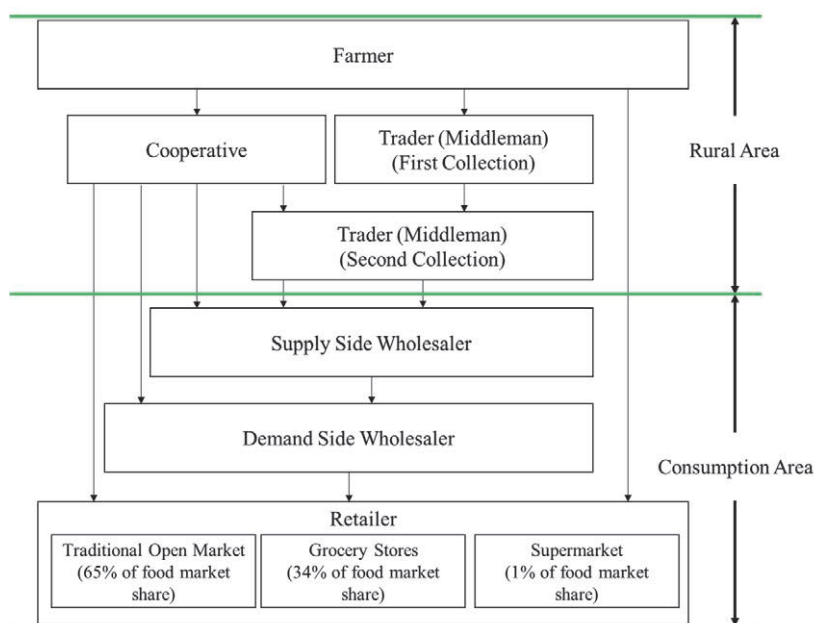
Therefore, as one of JICA's priority projects, it is conceivable to conduct a pilot project for each commodity item to explore best practices for collaboration between NAVSA and cooperatives. Specifically, proposals will be received from cooperatives that wish to utilize NAVSA, and upon selection, the best proposals will be provided with some funds to develop agricultural activities using NAVSA's functions. In addition, by monitoring the status of these activities, it is conceivable to promote the strengthening of activities by cooperatives using DX and to enhance the functions of NAVSA.

2.2.3 Agriculture Distribution

(1) Domestic Distribution

1) General Situation

In Nigeria, various stakeholders are involved in the distribution process, ranging from farmers to retailers. The typical distribution system from rural areas to major consumption areas involves a maximum of five stages, as illustrated in the figure to the right. These stages include i) sales to traders or cooperatives for the first collection at a village level, ii) sales to other traders for the second collection, iii) sales to supply-side wholesalers at a consumption area level, iv) sales to demand-side



Source: Prepared by the JICA Survey team based on Urban food systems, food security and nutrition in West Africa (Stefano Marras, et.al, 2017)

Figure 2-24 Typical distribution system in Nigeria

wholesalers and v) sales to retailers. Traditional open markets constitute the primary market at the retail level, accounting for approximately 65% of the total.

2) General Situation of Storage, Transportation, and Distribution in Rural Areas

Most small-scale farmers in rural areas store their products in traditional and improvised structures for storage, such as baskets, sacks, and sheds, without maintaining moisture content and controlling pests, while large-scale farmers can access modern silos and warehouses⁴⁷. For transportation, most small-scale farmers transport their products via headloads, animal forces, bikes, or bicycles, as they do not own motorized vehicles.

The Ministry of Agriculture and Natural Resources of the Kwara State Government pointed out that insufficient storage in production areas has also forced farmers to sell their harvests immediately after harvesting. For example, in the Duku Lade irrigation project, where paddy is primarily produced in the rainy season, farmers need to dry their harvested paddy on their farms and sell it to off-takers at the offered price, as the scheme does not have any storage.

⁴⁷ Food Smart Country Diagnostic (World Bank, 2020)

The average distance from their farm to the nearest motorable road is around 14 km⁴⁸, which makes it difficult for them to transport their products and participate in markets without relying on traders. The physical distance between the farm gate and markets can result in information asymmetry between farmers and traders, leading to lower incomes for the farmers. In particular, for perishable crops like tomatoes, seasonality causes farmers to leave a significant portion of the crop in the field or sell at lower prices when markets are saturated⁴⁹.

Nasarawa State's vegetable market⁵⁰ employs a system where wholesale prices are gathered and then shared with the public through radio broadcasts every Saturday to reduce the asymmetry. Registered wholesalers are expected to purchase vegetables from farmers according to these announced prices. Additionally, agri tech companies like Zowasel assist by disseminating market information to support farmers and cooperatives. The National Information Technology Development Agency (NITDA) is also in the process of utilizing the National Adopted Village for Smart Agriculture (NAVSA) to share this valuable market data.

3) Distribution from Rural Areas to Consumption Areas

Long-distance transportation is necessary to distribute agricultural products from rural areas to consumption areas due to the concentration of production in the north, while wholesale and consumer markets are situated in the south. The primary route used for transportation from the north to the south is the Lagos-Kano-Jibiya Corridor (LAKAJI Corridor), a critical transportation route for agricultural products with 1,225 km-long passing through eight states: Kaduna, Kano, Katsina, Kwara, Lagos, Niger, Ogun, and Oyo⁵¹. The LAKAJI Corridor not only connects the interior of the country with international markets but also serves as a significant conduit for food supply from the north to the south.

Transportation from rural areas to consumption areas is mainly done in open, non-refrigerated trucks with capacities ranging from 10 to 30 tons⁵². Due to the low quality of roads⁵³ and limited road surface ratio⁵⁴, transportation takes a considerable amount of time. For instance, it takes more than two days to transport goods from Kano State, one of the major production areas, to Lagos via the LAKAJI Corridor⁵⁵. Additionally, the poor quality of the federal road from Ilorin to Patigi, where the Duku Lade irrigation project is located, has increased the travel time to 4 hours for a distance of around 150 km by a 4-wheel vehicle. Regulations by some states restricting truck traffic entering city centers during the day to avoid traffic jams and accidents have also extended transportation times.

⁴⁸ SMALL FAMILY FARMS COUNTRY FACTSHEET (FAO 2018)

⁴⁹ Food Smart Country Diagnostic (World Bank, 2020)

⁵⁰ It is an open market where more than 100 wholesalers are registered members and sell vegetables purchased from farmers to retailers or consumers in Lafia City.

⁵¹ Food Smart Country Diagnostic (World Bank, 2020)

⁵² Food security and post-harvest losses in fruit marketing in Lagos metropolis, Nigeria (Busari, Ahmed O, et.al, March 2015)

⁵³ The quality of roads of Nigeria was rated at 2.5 points in 2019 (on a scale of 1 being low, to 7 being high), against the global average of 4.07 points (TheGlobalEconomy.com, 2019)

⁵⁴ The road surface ratio is 18% (Final Report survey on food value chain development for food security and nutrition improvement in Sub-Saharan Africa, JICA, 2020)

⁵⁵ Final Report survey on food value chain development for food security and nutrition improvement in Sub-Saharan Africa (JICA, 2020)

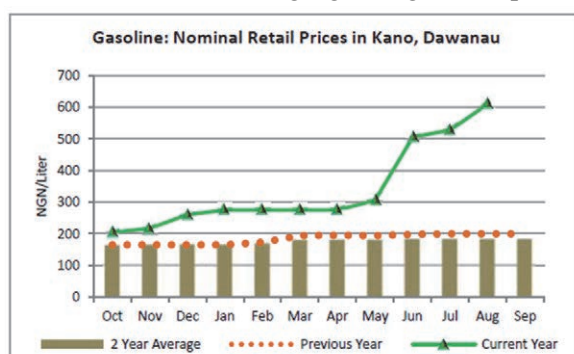
The table below shows the transportation costs from port cities to several other cities in the region, revealing that Nigeria's costs are higher than in other neighboring countries due to the above mentioned long transportation time.

Table 2-30 Transportation costs in Nigeria and neighboring countries

Route	Transportation cost (USD/ton/km)
Lagos to Kano	0.09
Cotonou to Niamey	0.08
Lome to Ougodougou	0.07
Abidjan to Bamako	0.06

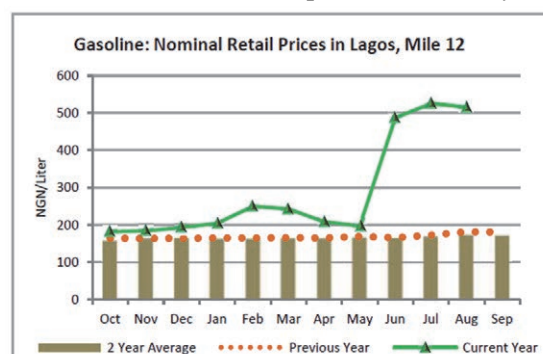
Source: The Cost of Transporting Cereals in West Africa
(International Food Policy Research Institute, September 2018)

More seriously, the costs have been higher due to the increase in domestic fuel prices. The expense for transporting a 30-ton truck, equipped with either 12 or 16 tires, from Kano State to Lagos State now totals approximately N 1.2 million and N 1.6 million, respectively. Moreover, numerous traders have faced soaring fuel prices following the government's decision to discontinue subsidies since May 2023. As shown in the following figures, gasoline prices have more than doubled compared to the last year.



Source: Nigeria Price Bulletin (September 2023)
(Famine Early Warning Systems Network)

Figure 2-25 Nominal retail price of gasoline in
Kano

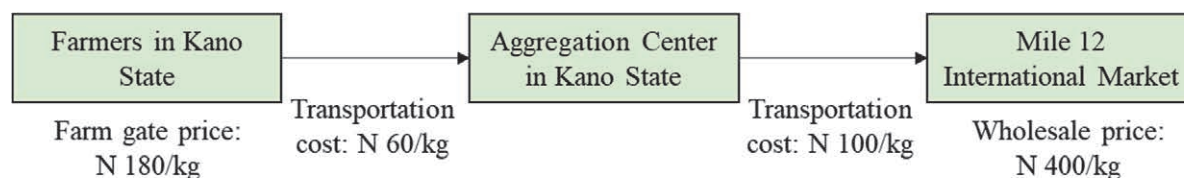


Source: Nigeria Price Bulletin (September 2023)
(Famine Early Warning Systems Network)

Figure 2-26 Nominal retail price of gasoline in
Lagos

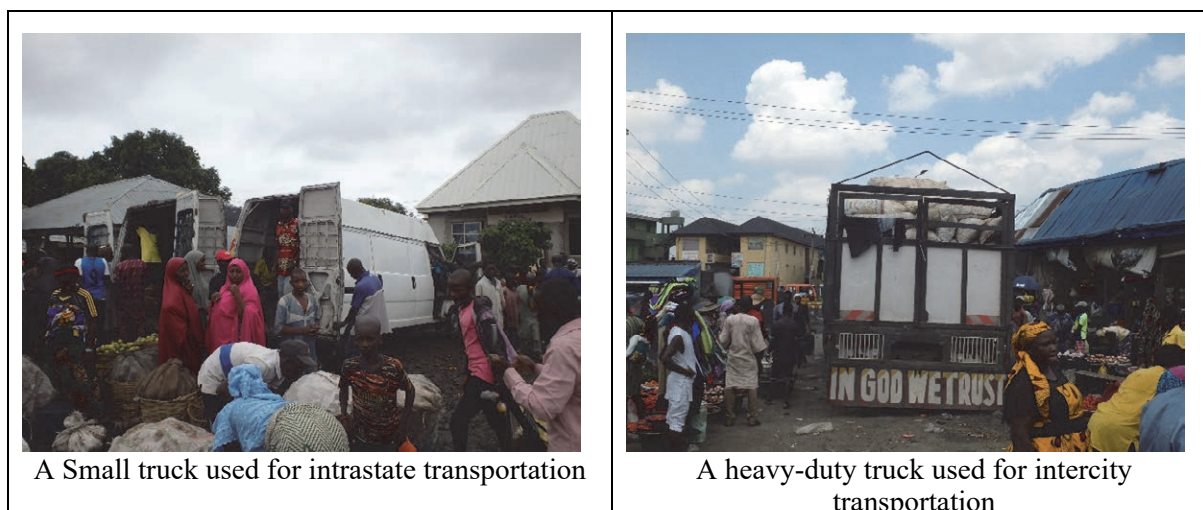
The figure below illustrates the cost breakdown of 1 kg of carrots transported from Kano State to the Mile 12 International Market as of June 2023, the largest wholesale market for fresh vegetables in West Africa. This breakdown indicates that distribution expenses comprise approximately 40% of the total wholesale market price⁵⁶.

⁵⁶ In Japan, 30% of the wholesale price of vegetables is the distribution cost.



Source: Prepared by the JICA Survey team based on the hearing results in the Mile 12 International Market

Figure 2-27 Cost breakdown of 1 kg of carrots from Kano State to the Mile 12 International Market as of June 2023



4) General Situation of Wholesale Market and Retail Market

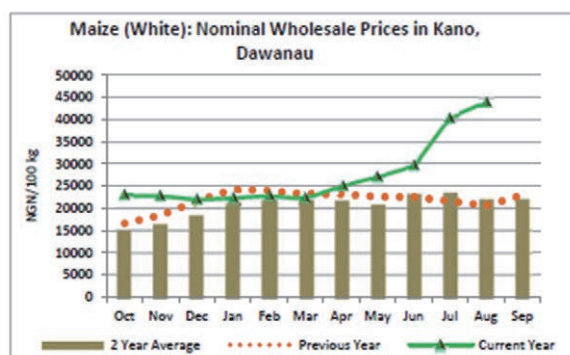
Agricultural products are primarily traded in open markets that serve both wholesale and retail purposes. In Nigeria, there are several markets where only state traders are allowed as members, as seen in the case of the Lafia vegetable market in Nasarawa State. Conversely, there are national and international markets with significant participation, like the Mile 12 International Market in Lagos State, which boasts over 50 thousand traders. Open markets teem with stalls of 5-10m², clustered by food types, ethnicity, and seller gender, and each market has different products and traders. For example, Lagos State hosts 10 expansive open markets that manage agricultural and fishery products sourced from both within and outside the state. A significant 70% of the products sold in these markets are consumed within Lagos State⁵⁷. Taking the Mile 12 International Market mentioned earlier, it primarily focuses on fresh products and grains, catering to supply-side wholesalers and demand-side wholesalers. In contrast, the Oyingbo Market handles a variety of items, including fresh products and edible meat, distributed by demand-side wholesalers to retailers and consumers. The Liverpool Market specializes in fishery products.

Each market has been developed by the Government or donors and operated by a central association comprising representatives from the traders, monitoring trade under the supervision of the Local Government Authority (LGA). These associations collect fees based on trade volume, and they also play

⁵⁷ Urban food systems, food security and nutrition in West Africa (Stefano Marras, et.al, 2017)

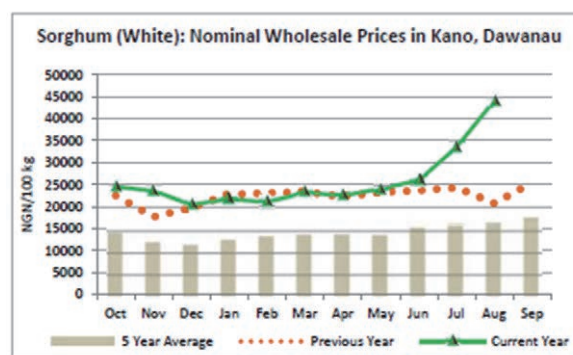
a role in developing market infrastructure in addition to fulfilling their tax obligations to the LGA. The LGA oversees the market's operations conducted by the associations and implement corrective actions as deemed necessary. In October 2023, the Lagos State Government issued an order for the cessation of operations at Mile 12 International Market due to its non-compliance with environmental standards for waste disposal and other environmental criteria outlined in the Lagos State Environmental Sanitation Law. Following the completion of corrective measures and subsequent confirmation, the Lagos State Government permitted the market to resume its operations.

As mentioned above, the retail price of gasoline has increased since June 2023, causing the wholesale price of major crops to escalate, as shown in the following figures.



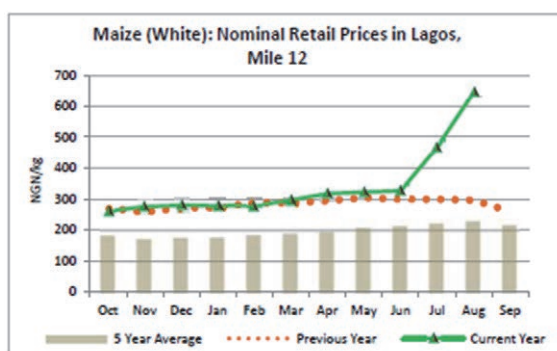
Source: Nigeria Price Bulletin (September 2023)
(Famine Early Warning Systems Network)

Figure 2-28 Nominal retail price of maize in
Kano



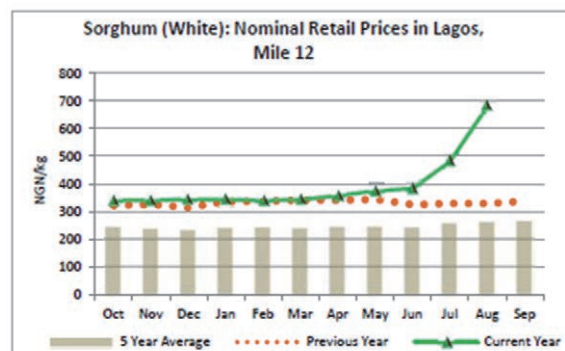
Source: Nigeria Price Bulletin (September 2023)
(Famine Early Warning Systems Network)

Figure 2-29 Nominal retail price of sorghum in
Kano



Source: Nigeria Price Bulletin (September 2023)
(Famine Early Warning Systems Network)

Figure 2-30 Nominal retail price of maize in
Lagos



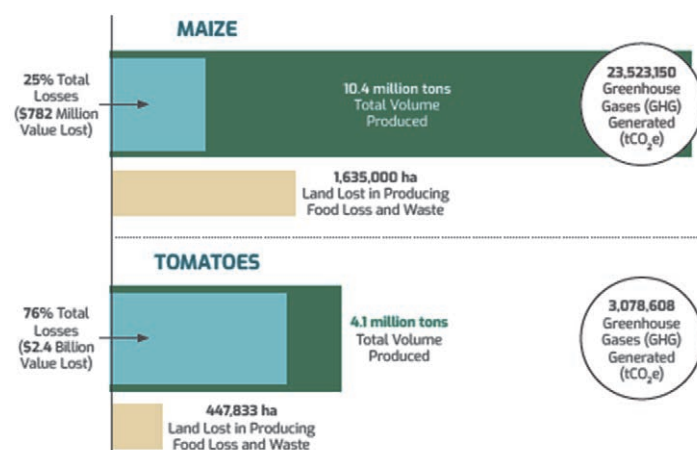
Source: Nigeria Price Bulletin (September 2023)
(Famine Early Warning Systems Network)

Figure 2-31 Nominal retail price of sorghum in
Lagos

The rapid escalation has resulted in negative impacts on food security in Nigeria.

5) Post-harvest Losses

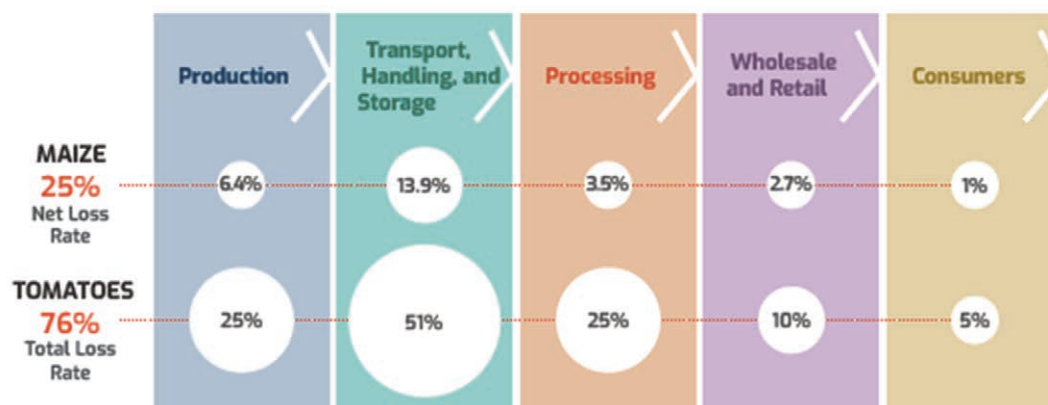
Post-harvest losses in Nigeria are significant, particularly for perishable crops such as fruits and vegetables. These losses are estimated to reach 50% of the total production value annually⁵⁸, exceeding the average for sub-Saharan Africa (20% to 40%)⁵⁹. The impact of post-harvest losses on the Nigerian economy is significant, with an estimated 9.1% of Nigeria's GDP lost due to post-harvest losses⁶⁰. The World Bank⁶¹ also reported that 25% and 76% of maize and tomatoes produced were lost, as indicated in the figure to the right.



Source: Food Smart Country Diagnostic (World Bank, 2020)

Figure 2-32 Production, losses, and associated impacts for maize and tomatoes in Nigeria in 2017

World Bank also identified hotspots where post-harvest losses occur in the value chain. As shown in the following figure, the primary stages where losses are incurred include production, transport, handling, and storage.



Source: Food Smart Country Diagnostic (World Bank, 2020)

Figure 2-33 Food loss and waste hotspots along the value chain

Regarding plantains and bananas, it was also estimated that half of the losses occur during

⁵⁸ <https://www.nspri.gov.ng/index.php/en/more/general-news/298-pessu-nigeria-records-50-post-harvest-losses-annually> (Accessed: 18th April 2023)

⁵⁹ Post-harvest food losses in a maize-based farming system of semi-arid savannah area of Tanzania (Abass, A.B.; Ndunguru, G.; Mamiro, P.; Alenkhe, B.; Mlingi, N.; Bekunda, M, 2014)

⁶⁰ Food Smart Country Diagnostic (World Bank, 2020)

⁶¹ Food Smart Country Diagnostic (World Bank, 2020)

transportation from the farm gate to retailers, accounting for 2.5% to 6.6% of wholesalers' potential total revenue⁶².

One of the key factors contributing to the elevated post-harvest loss rate is the utilization of traditional baskets for transportation. As depicted in the image below, crops are often transported using wooden baskets, leading to crop damage in the process. To address this issue and mitigate post-harvest losses during transportation, some distributors have opted for plastic containers; however, these containers come with a higher cost compared to the traditional baskets (traditional baskets: N 300 per piece; reusable plastic containers: N 1,200 per piece), making them less commonly adopted.



Another reason is limited access to cooling fans, refrigeration, and other cooling technologies that can protect food. Although Nigeria's cold chain capacity increased from 10,000 cubic meters in 2014 to 200,000 cubic meters in 2018, an increase of 20 times, it is still estimated that 37% of Nigerian agricultural production requiring refrigeration is lost due to the inefficient or non-existence of cold chains⁶³. Furthermore, the lack of appropriate cooling at home leads to consumer food waste. Rural regions are particularly affected by an unreliable power supply, where approximately 50 million Nigerians lack electricity and essential refrigeration⁶⁴.

(2) Agricultural export

1) General Situation

Nigeria has faced an agricultural trade deficit, though the agricultural export value has increased. In four years (2016–2019), Nigeria's cumulative agricultural imports stood at N3.35 trillion, four times higher than the agricultural export of N803 billion within the same period. The primary agricultural exports from Nigeria are cocoa beans, sesame, cashew nut, cotton, and ginger, which amounted to USD 1,119 million (74% of the total export value), as presented in the following table.

⁶² Urban food systems, food security and nutrition in West Africa (Stefano Marras, et.al, 2017)

⁶³ Food Smart Country Diagnostic (World Bank, 2020)

⁶⁴ Food Smart Country Diagnostic (World Bank, 2020)

Table 2-31 Major exported agricultural products and their value in the Year 2020

No.	Exported agricultural product	Export value (USD Million)
1	Cocoa bean	511
2	Sesame	338
3	Cashew nut	164
4	Cotton	55
5	Ginger	51
6	Others	389
Total		1,508
Top 5 exported agricultural products		1,119 (74% of the total export value)

Source: Prepared by the JICA Survey team based on FAO STAT

2) Quarantine System for Import and Export of Agricultural Products

Several governmental organizations are involved in the import and export of agricultural products. The following table indicates the major organizations concerned with imports and exports.

Table 2-32 Organizations involved in imports and exports and their overview

Organization	Regulatory authority	Overview
Nigeria Customs Service (NCS)	Ministry of Finance	- NCS is responsible for the collection of import and export duties and the control of anti-smuggling. - The headquarter is located in Abuja, and it has four regional offices. - Importers are required to register with NCS. - Importers have to submit an application for import procedures, called Form M, to NCS for approval by the NCS.
Nigerian Ports Authority (NPA)	Ministry of Transportation	- NPA is responsible for the management and operation of Nigerian ports. - The headquarter is located in Lagos. - Shipping companies are required to pay a fee to NPA when their vessels enter or leave the port. - NPA has promoted the Single Window Portal, which has not yet been released. The portal is supposed to allow traders to access customs regulations, submit customs documents, track transaction status, and make payments online in order to facilitate customs clearance.
National Export Promotion Council (NEPC)	Ministry of Commerce and Industry	- NEPC is responsible for promoting trade in Nigerian products other than petroleum. - The headquarters is located in Abuja, and it has six regional offices. - Exporters are required to register with NEPC. - Its mandate is to i) coordinate and harmonize export development and promotion activities, ii) take the lead in all national export programs, and iii) interface with international trade agencies on cooperation and capacity building.
Quality Competent Authorities (QCA)	Responsible ministries*	The authorities evaluate compliance with international standards and certifications at the time of export.

*QCA has been established under each ministry. Each responsible ministry of the QCA is shown in the next Table.

Source: JICA Survey team

In order to export agricultural products to Nigeria, almost all products shall be certified under the Standards Organization of Nigeria Conformity Assessment Program (SONCAP) managed by Standard Organization of Nigeria (SON). Exporters shall receive inspection prior to shipping and obtain a SONCAP certificate indicating that exported products comply with Nigerian standards. For food products, certification by the National Agency for Food and Drug Administration and Control (NAFDAC) is also required. Furthermore, they are also required to comply with standards such as the Nigerian Industrial Standards (NIS) or the International Organization for Standardization (ISO).

As of 13th October 2021, the agricultural products whose imports are restricted are as follows:

- Prohibited imports absolutely: Exhausted tea or tea mixed with other substances (“Exhausted tea or tea mixed with other substances” means that the product has lost its original quality due to soaking or decoction), Meat, vegetables, or other provisions declared by a health officer to be unfit for human consumption
- Prohibited or restricted imports: Live or dead birds including frozen poultry, Pork and the products, Beef and the products, Bird’s eggs, excluding hatching eggs, Refined vegetable oils and fats, Cane or beet sugar and chemically pure sucrose, in solid form containing added flavoring or coloring matter in retail packs, Cocoa butter, powder and cakes, Spaghetti and noodles, Fruit juice in retail packs, Waters, including mineral waters and aerated waters containing added sugar, sweetening matter, or flavored; other non-alcoholic beverages but excluding energy or health drinks; beer and stout (bottled, canned or otherwise packed), Tomato paste or concentrate put up for retail sale

Exporters need to receive the following documents from relevant governmental organizations:

- i) Exporter registration document issued by NEPC, and
- ii) Quality assurance document issued by QCAs.

Exporters complete and submit an application to NEPC through the its electronic registration platform. NEPC reviews the application and subsequently provides the exporter with a registration certificate. QCAs assess the quality and safety of the agricultural products intended for export and issue a certificate of quality assurance. As outlined in the table below, multiple agencies are responsible for issuing quality assurance certificates for each product.

Table 2-33 Major quality competent authorities and their role

No.	Organizations (Responsible Ministry)	Roles	Applicable product
1	NAFDAC (Ministry of Health)	- NAFDAC is the designated competent authority under Codex Alimentarius in compliance with Sanitary and Phytosanitary (SPS) measures. - It can issue the health certificate and the certificate of manufacture.	- Processed agricultural products - Livestock products
2	Nigeria Agricultural Quarantine Services (NAQS) (FMAFS)	- NAQS is the designated competent authority under the International Plant Protection Convention (IPPC) in compliance with SPS measures. - It can issue the phytosanitary certificate. - It has also published updated	- Agricultural products - Processed products

No.	Organizations (Responsible Ministry)	Roles	Applicable product
		regulations for major exported products to major destination countries on its website. – It has provided an electronic phytosanitary certificate application system for exporters.	
3	Department of Veterinary and Pest Control Services (DVPCS) (FMAFS)	– DVPCS is designated as the competent authority under the World Organization for Animal Health standards, guidelines, and recommendations as stipulated by the Office International des Epizooties (OIE).	– Livestock products
4	Department of Fisheries (FMAFS)	– The Department of Fisheries is designated as the competent authority for the issuance of health certificates for the export of fish and fishery products.	– Fish and fishery products
5	SON (Independent agency)	– SON accredits laboratories for physiochemical and microbiological tests on food samples.	– Agricultural, livestock, and fisheries products

Source: JICA Survey team

Despite the initiatives to streamline export procedures by digitizing export/import control systems, such as the platform developed by NEPC, exporters continue to encounter substantial time and financial expenses during these processes. According to Doing Business 2020 issued by the World Bank, Nigeria's duration and cost of customs, quarantine, and shipping procedures are more extended than the Sub-Saharan African average, as evidenced in the table below.

Table 2-34 Comparison of the number of days and cost of export procedures

Item	Country and Region		
	Nigeria	Sub-saharan Africa	OECD Countries
Time to export: Border compliance (hours)	128	97.1	12.7
Cost to export: Border compliance (USD)	786.0	603.1	136.8
Time to export: Documentary compliance (hours)	74	71.9	2.3
Cost to export: Documentary compliance (USD)	250.0	172.5	33.4

Source: Prepared by the JICA Survey team based on Doing Business 2020 (World Bank, 2020)

Interviewed exporters also emphasized that customs, quarantine, and shipping procedures heavily rely on interpersonal interactions. They noted that in cases where the responsible person from the leading organization is absent, issues arise, such as document rejection and delays in the document approval process.

3) Port Management for Export

The majority of Nigeria's agricultural products are exported via sea transportation. The two primary ports are Apapa and Tin Can, which collectively accounted for approximately 57% of all vessel traffic among the six major ports (Apapa, Tin Can, Delta, Rivers, Onne, and Calabar) in 2017. The congestion

at these ports has reached such a critical level that exporters interviewed reported an estimated ten days to two weeks for the process of entering the Apapa port from Lagos City and loading containers.

In response to this persistent congestion issue, NPA has introduced an electronic call-up system. This system separates handling time zones for export and import cargo and incorporates electronic gates to record truck arrival and departure times, manage time allocations, and streamline the entry and exit of cargo trucks. Additionally, starting in April 2023, licenses were granted to ten operators of export port terminals, enabling them to offer a comprehensive one-stop customs clearance service at each terminal.

4) Evaluation of Agricultural Products in International Markets

Several exporters and relevant governmental organizations were interviewed to confirm the evaluation of the top three agricultural products (cocoa, sesame, and cashew nuts) exported from Nigeria to international markets. The following table summarizes the interview results in terms of quality, cost, and sanitary standards.

Table 2-35 Evaluation of agricultural products in the international markets

Item	Product	Evaluation
Quality	Cocoa	– The awareness of quality control by VC actors is low, and the quality is inadequate compared to neighboring countries (Cote d'Ivoire and Ghana)
	Cashew nuts	– The quality is high, and in addition to Vietnam and India, which are major exporters, the United States, Canada, Turkey, and other countries have shown interest.
	Sesame	– The quality is highly regarded by Japan, a key importing nation, leading Japanese import companies to consistently place orders.
Cost	Cocoa	– The processing cost is high compared to major producing countries, primarily due to insufficient production volumes and high electricity and labor expenses. These factors have led to the export of raw materials rather than processed goods.
	Cashew nuts	
	Sesame	– The cost is lower than in other countries, but the market is competitive and less profitable.
Sanitary standard	All products	– When the residue levels of organophosphorus pesticides do not meet the standards, imports are rejected by quarantine regulations.
Others	All products	– Customs, quarantine, and shipping procedures take time, and cargoes are not loaded onto contracted vessels, resulting in delays in arrival in the importing country and loss of customer trust. In addition, additional storage fees at bonded warehouses are incurred.

Source: JICA Survey team

The table above illustrates that, except for cocoa, Nigeria's primary export products are well-regarded in international markets for their quality. However, due to substantial processing costs, these products are not processed domestically but instead exported as raw materials to various countries. Delays in customs and other export procedures have caused late arrivals of products to import countries, resulting in the loss of customer trust. Additionally, farmers' insufficient knowledge of proper pesticide application has increased pesticide residues in final products, which have been rejected in destination countries.

Among the companies interviewed, Agro Traders, a Nigerian-owned company, is one of the most

advanced companies in the industry. The company has contracted with nine cocoa production cooperatives (comprising approximately 20,000 farmers) to procure raw materials while offering inputs and technical guidance, including proper pesticide application, to these cooperatives. In addition, the company has acquired international standards such as Rainforest Alliance and Food Safety System Certification 22000, and is working to enhance its value. The company has also processed primary processed products in the processing factory based on customer requests.

(3) Production and Consumption of Major Agricultural Products in Geopolitical Zones

In order to analyze the distribution channels of significant agricultural products in Nigeria, a comprehensive comparison was undertaken between the production and consumption patterns across six geopolitical zones: North East, North Central, North West, South East, South South, and South West. The following assumptions were employed for this comparative analysis, along with the method used for calculating production and consumption amounts:

Assumption

- Agricultural products for which data are available in the National Report of Wet Season Agricultural Performance in Nigeria 2021 (APS) (a total of 9 products: cereals: rice, maize, sorghum, yams, cassava, millet, plantain, soybean, vegetables: tomatoes).
- Since per capita consumption generally varies with income level, the Gross National Income (GNI) per capita is considered in each zone's consumption calculation.

Method of calculating production amount for each zone

- The production per geopolitical zone is calculated based on the production amount of APS.

Method of calculating consumption amount for each zone

- The consumption amount for each geopolitical zone is calculated based on each state's population⁶⁵, GNI⁶⁶, and per capita consumption⁶⁷.

The following table shows the analysis results of production and consumption in the geopolitical zones for all nine commodities.

Table 2-36 Analysis results of production and consumption in the geopolitical zones

Product	Production area	Distribution channel	Challenges to distribution improvement
Cereal			
Rice	All of the northern zones	- All of the northern zones have achieved regional self-sufficiency. - In the South South and South West zones, consumption has surpassed production, indicating paddy (or milled rice) distribution from the northern regions to fulfill demand in these areas.	Development of warehouses based on the processing capacity of each region
Maize	All of the northern	- All of the northern zones have achieved regional self-sufficiency.	

⁶⁵ Demographic Statistics Bulletin in 2019 (National Bureau of Statistics, 2019)

⁶⁶ National Human Development Report 2018 (United Nations Development Program, 2018)

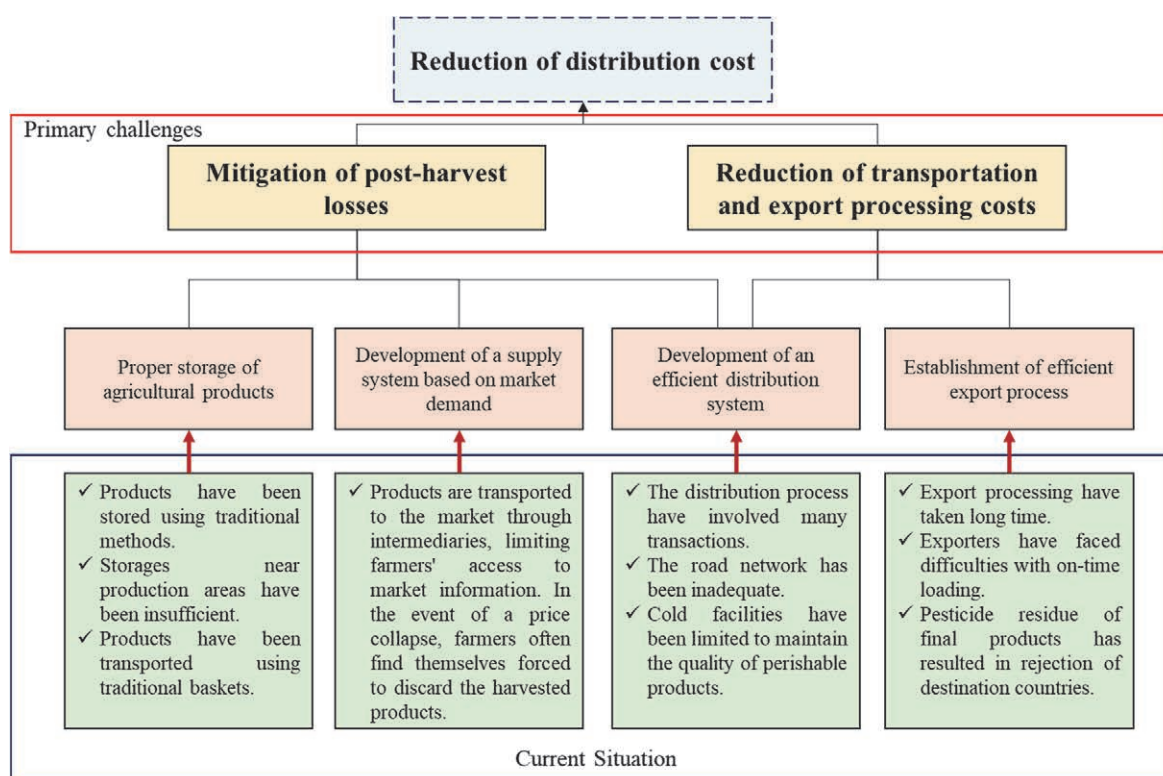
⁶⁷ FAO STAT

Product	Production area	Distribution channel	Challenges to distribution improvement
	zones, South West	- In the South South zone, consumption has surpassed production, indicating distribution from the northern regions to fulfill demand in the zone.	
Sorghum	All of the northern zones	- All of the northern zones have achieved regional self-sufficiency. - Production has been low throughout the Southern zones, indicating that sorghums have been distributed from the Northern zones to the Southern zones.	
Yam	North Central	- Yams have been produced within each zone, leading to self-sufficiency within their zones. This suggests that the distribution outside the zone is likely limited.	Promotion of local processing and consumption
Cassava	North Central, All of the southern zones	- Cassavas have been produced within each zone, leading to self-sufficiency within their zones. This suggests that the distribution outside the zone is likely limited.	
Millet	All of the northern zones	- All of the northern zones have achieved regional self-sufficiency. - Production has been low throughout the Southern zones, indicating that millets have been distributed from the Northern zones to the Southern zones.	Development of warehouses based on the processing capacity of each region
Plantain	South South	- Plantains produced in the South South zone have been distributed to each zone.	Development of cold storage based on the processing capacity of each region
Soybean	All of the northern zones	- All of the northern zones have achieved regional self-sufficiency.	Promotion of local processing and consumption
Vegetable			
Tomato	North Central, North West, South West	- In the South South and South West zones, consumption has surpassed production, indicating distribution from North East and North West zones to these zones.	Development of cold storage along the LAKAJI corridor

Source: JICA Survey team

(4) Challenge in Agricultural Distribution

From the viewpoint of agricultural distribution, it is essential to reduce distribution costs to enhance the value chain. Based on the current situation outlined in sections 2.2.3 (1) to 2.2.3 (3), the primary challenges in reducing the costs can be summarized: i) mitigation of post-harvest losses and ii) reduction of transportation cost and export processing cost, as presented in the following figure.



Source: JICA Survey team

Figure 2-34 Challenges in agricultural distribution

As the current post-harvest loss rate stands at an alarming 50%, it is essential to mitigate the losses. In order to deal with the challenge, it is important to promote proper storage of agricultural products by strengthening the storage capacity of value chain actors and improving infrastructure such as warehouses. In addition, it is also inevitable to i) develop a supply system based on demand by developing a market information-sharing platform, ii) improve the road network and deploy refrigeration facilities, and iii) develop an efficient distribution system by strengthening the linkages among value chain actors. Since transportation and export processing costs have been higher than those in Sub-Saharan African countries, reducing these costs is also challenging. In order to achieve this, in addition to the development of an efficient distribution system as described above, it is necessary to promote intra-regional processing and distribution, joint transportation by distributors, and the digitization of export procedures.

2.2.4 Agricultural Finance

(1) Financial system as a whole

The financial market system and regulations in Nigeria are regulated and supervised by the following laws and regulations with respect to banks and other financial institutions, insurance, pension funds, collective investment schemes and capital markets, and cooperative finance:

Table 2-37 Laws and regulations and Supervision of Financial Markets

Sectors	Laws, Regulations	Supervision, Associations, Self-Regulatory Organizations (SROs)
Banks and Other Financial Institutions	Banks and Other Financial Institutions Act, 2020 Central Bank of Nigeria Act, 2007	It is supervised by the Central Bank of Nigeria (CBN). The CBN's President and Vice President are appointed by the President and confirmed by the Senate. Subjects of supervision are broadly divided into Banks, Specialized Banks and Other Financial Institutions. CBN established a Bankers' Committee to promote sound bank behavior, discipline and banks' cooperation. The subcommittee, The Chartered Institute of Bankers of Nigeria (CIBN), has established self-regulations such as a code of conduct. It also licenses and inspects Micro Finance Institutions.
Insurances	Insurance Act, 2003	National Insurance Commission (NAICOM) supervises under Federal Ministry of Finance. https://www.naicom.gov.ng/ Nigerian Insurers Association (NIA) is active as a member association. (https://www.nigeriainsurers.org/)
Pensions	Pension Reform Act, 2014	National Pension Commission directly reporting the President is in charge of supervision. https://www.pencom.gov.ng/ Pension Fund Operators Association of Nigeria is active as a member association. https://www.penop.com.ng/
Collective investment scheme and capital markets	Investment and Securities Act, 2007	Securities and Exchange Commission (SEC) supervises under Federal Ministry of Finance https://sec.gov.ng/ Securities Exchanges and Capital Trade Points (small-sized exchange) must be licensed and supervised by SEC as a SRO. Nigerian Exchange (NGX) is the licensed exchange. https://ngxgroup.com/ Venture Capital needs a license on collective investment scheme from SEC. There are some member associations such as Private Equity and Venture Capital Association of Nigeria. https://pevcang.org/about/
Cooperative finance (Credit cooperative)	Nigerian Cooperative Societies Act, 1993	The Federal Department Of Cooperatives (FDC) of FMARD supervises cooperatives. https://fdc.fmark.gov.ng/2021/10/16/welcome-to-fda/ National Cooperative Financing Agency of Nigeria (CFAN) supports and supervises member cooperatives as APEX (higher organizations) https://www.cfan.coop/about-cfan/

For the whole financial system stability covering each sector of the financial markets supervised by different regulators, the Financial Services Regulation Coordinating Committee is established in accordance with the Central Bank of Nigeria Act (2007). It is chaired by the Governor of CBN, and coordinates the supervision and regulation of the financial sector as a whole.

The following is a breakdown of Banks and Other Financial Institutions that are the main players in agricultural finance. The classification of business categories and the number of registered businesses, as of March 2023 at the CBN website, are shown in the table below. Among Banks, Merchant Banks are targeting large institutions and high net worth (HNW) individuals, are not allowed to accept current

accounts and are prohibited from holding stocks for more than six months.

Table 2-38 Overview of Banks and Other Financial Institutions (OFIs)

Types of Banks and OFIs		Breakdown or/and Number of registered institutions
Banks	Commercial Banks	24
	Merchant Banks	6
Specialized Banks	Development Finance	Bank of Agriculture Bank of Industry Development Bank of Nigeria Nigerian Export Import Bank The Infrastructure Bank Federal Mortgage Bank of Nigeria,
	Other Specialized Banks	Microfinance Bank (887) Non-Interest Bank (3) Primary Mortgage Institution (34)
Other Financial Institutions		Finance Company (106) Discount House (5) Payment Service Bank (3) Holding Company (6) Bureau De Change (2,992)

Source : CBN Website (as of March 2023)

(2) Supervision and regulation banks and other financial institutions

1) Position of CBN

Banks and other financial institutions are supervised by the Central Bank of Nigeria (CBN) under the Banks and Other Financial Institutions Act, 2020 and the Central Bank of Nigeria Act, 2007.

The Banks and Other Financial Institutions Act, 2020 (Banking Law) stipulates that the provisions of the Act apply notwithstanding the provisions of the Federal Competition and Consumer Protection Act. The Act also allows the CBN, at its discretion, to establish the Resolution Fund which can require banks to shoulder costs of operation and transfer of failed financial institutions. It also stipulates that “Special Tribunal for the Enforcement and Recovery of Eligible Loans” can be used to coordinate the rights of the parties concerned. As a result, the CBN has strong authority to maintain the stability of the financial system as a whole. Furthermore, in order to facilitate the resolution of bankrupt banks, an asset management company (Asset Management Corporation of Nigeria (AMCON)) shall separate and manage assets of failed financial institutions before transferring the assets to a sound bank, based on Asset Management Corporation Act. In addition, banks are prohibited from owning non-operational real estate to limit the volatility of bank assets.

On the other hand, CBN also has the mission of facilitating finance to support economic and rural development. In this regard, the regulations allow banks to invest in agribusiness companies, SMEs, as well as private equity and venture capital firms (However, there is an upper limit of 10% or less of the bank's shareholders' equity and 20% or less of the paid-up capital of the investee company.). As will be discussed later, the CBN is also responsible for development financing, such as providing low-interest loans and credit guarantee to encourage banks to lend to agriculture sector and SMEs.

2) Regulations for soundness of banks

In general, supervision of depository financial institutions, including banks, requires that supervised institutions periodically to submit quantitative report regarding their financial soundness (offsite monitoring), and conducts onsite inspections as well. Onsite inspections include regular inspections, which are conducted at a certain frequency, and special inspections, which are conducted when alarming figures are confirmed through offsite monitoring or when other problems are observed. In Nigeria, the Banking Law also stipulates that CBN supervises through offsite monitoring and onsite inspection.

i) Capital Adequacy Ratio

The minimum required capital adequacy ratio (CAR) for internationally significant financial institutions is 15% and 10% for other banks. On overall banks base, the CAR is 14.5% in 2019 according to CBN's "Banking Supervision Annual Report".

ii) Regulations to maintain asset soundness of banks

The classification of loans other than "Specialized loans" (classification of sound loans and non-performing loans) is classified into performing loans, watchlist and non-performing loans (NPL) as shown in the table below. Furthermore, NPL is divided into three categories: Sub-Standard, Doubtful, and Lost Credit. Financial institutions must record loan loss provision in line with this loan classification.

Table 2-39 Loan classification and Provision

Loan classification	Objective criteria by past due	Provisioning
Performing	All due principal and interest payments have been settled or if not past due by more than 30 days	General Provision - 2 % of outstanding balance of performing facilities
Watchlist	Principal and/or interest is past due by 31 to 90 days	5 % provision on the outstanding principal amount
Non-performing	Classified by the following (show only objective criteria if past due)	100% principal repayments that are past due shall be fully (100 per cent) provided for and recognized on cash basis only
Sub-Standard	Past due principal and/or interest remain outstanding for at least 91 days but not more than 180 days	20% of principal repayments that are not yet due on nonperforming credit facilities
Doubtful	Unpaid principal and/or interest remain outstanding for at least 181 days but not more than 360 days	50% of principal repayments that are not yet due
Lost Credit	Unpaid principal and/or interest remain outstanding for more than 360 days and off-balance sheet engagements that have crystalized	100% of principal repayments that are not yet due

Source: CBN Prudential Guideline 2019

With respect to loan loss provision for the Lost Credit described above, it should be calculated by multiplying the amount remaining after deducting the appraised value of eligible collateral from the amount of the loan by the applicable provisioning ratio. Eligible collaterals include cash and deposits, government bonds, listed securities, bank guarantees, accounts receivables owed by blue-chip companies, residential mortgages, and commercial mortgages, provided that a collateral agreement with

perfection requirements has been completed in writing. Also, valuations of residential and commercial properties must be evaluated by a designated appraiser. The collateral value is the balance after deducting the discount rate (Haircut adjustments weightings) specified for each collateral type from the appraisal value. These calculation formulas are described in the CBN Prudential Guidelines as follows.

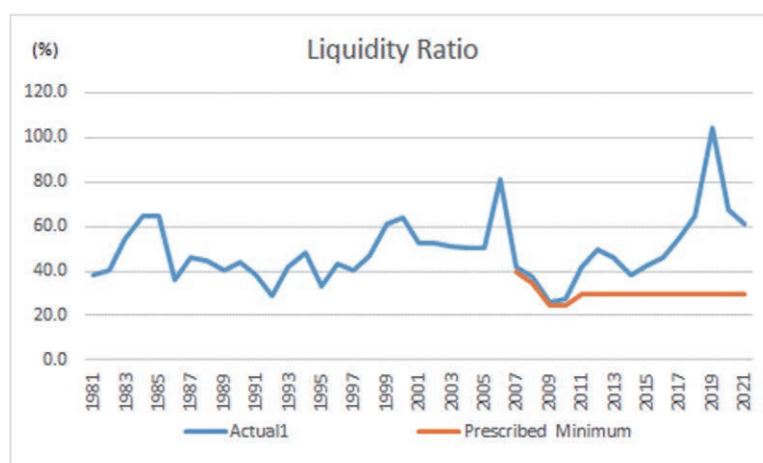
Collateral Adjustment for Lost Facilities $\text{Required Provision} = E - \{VC \times (1 - HW)\}$	Where, E = Total Exposure HW = haircut weightings VC = Value of Collateral

CBN requires banks to keep the NPL ratio not more than 5%. However, the NPL ratio for all banks in 2019 was 6.1%, which is higher than this according to CBN's "Banking Supervision Annual Report".

iii) Liquidity

Banks are required to hold a certain percentage of assets that can be immediately converted into cash to prepare for cash demands from depositors. In Nigeria, banks are required to maintain a liquidity ratio of 30% or more of government debt securities that can be sold on the market to the amount of short-term debt such as deposits.

Looking at the trends in the liquidity ratio in recent years in the chart below, we can see that it stays well above the regulatory level. However, since loans are not included in liquid assets, there is an aspect that loans are too small compared to deposits, CBN also has another minimum requirement to maintain loan at a certain level against deposits to encourage banks to lend to customers.



Source: Made by the study team based on CBN, Statistics Bulletin

Figure 2-35 Historical liquidity ratio of banks

iv) Limit on exposure to a single obligor/ connected lending

Credit to any one borrower (group), including related parties, should not exceed 20% of the bank's shareholders' equity (excluding impairments by losses). In the case of Microfinance Bank (MFB), the

upper limit is 1% of shareholders' equity for personal loans and 5% for organizations and corporations (according to an interview with the National Association of Microfinance Banks (NAMB)). In addition, credits to governments and government agencies (federal, state, LG) combined as a whole should not exceed 10% of the total credit portfolio. In addition, the total amount of credit extended to large borrowers (=borrowers who receive credit of 10% or more of the bank's shareholders' equity) must not exceed eight times the amount of shareholders' equity.

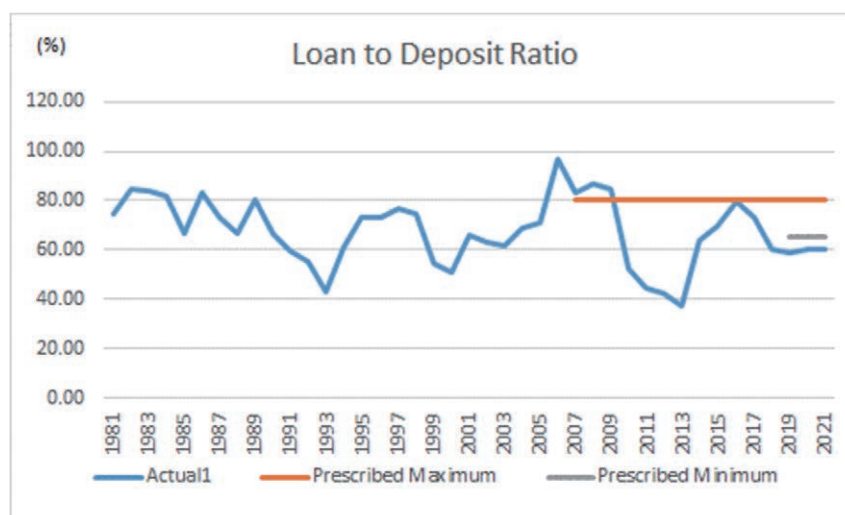
v) **Obtaining and reporting of credit rating**

Banks are required to obtain credit ratings from designated credit rating agencies on a regular basis and report them to CBN, and disclose the rating in annual reports and other media. Major Banks are rated by three major international credit rating agencies such as Standard and Poor's, Fitch Rating, and Moody's.

3) **Regulations and programs to promote development impacts**

i) **Loan to Deposit Ratio**

CBN requires banks to maintain a Loan-to-Deposit Ratio (LDR) of at least 65% (it appears to have been raised to this level in 2019) aiming at facilitating loan portfolio development. However, the required level of LDR has not always been achieved in the banking as a whole. It is said that especially larger banks have difficulty to meet the requirement. The penalty for non-compliance is to deposit 50% of the non-compliant amount into CBN reserves (according to Banking Supervision Annual Report).



Source: Made by the study team based on CBN, Statistics Bulletin

Figure 2-36 Historical Loan to Deposit Ratio

ii) **Credit Bureau (Credit Information Center)**

CBN enacted the Credit Reporting Act in 2017 and began a policy of establishing credit bureaus under

CBN licenses. Currently, CBN's Credit Risk Management System (CRMS) and three private organizations (First Central Credit Bureau Ltd, CRC Credit Bureau Ltd, and CR Services Credit Bureau Plc) are active. Financial institutions such as Commercial Banks and MFBs are obliged to use credit information centers. Financial institutions must obtain and refer to reports from at least two institutions when considering new credit. In addition, regarding the reporting of credits taken, credits of N1 million or more must be reported to CRMS, and all credits must be reported to at least two private institutions. The contents of the report include information of the credit and the status of delinquency as well as the attributes of the debtor.

In general, credit information centers have the purpose of easing the information opaqueness, especially for small borrowers, to facilitate lending, and to prevent over-lending and over-borrowing.

Issues to reconsider in Nigeria are that (i) credit cooperatives don't participate the credit information centers and (ii) reporting to the CRMS is limited to credits of N1 million and above. According to interviews with CBN, the reason why the reporting obligation to CRMS is limited to the credit amount is because the situation at the time of opening has been inherited, and there is no particular reason. It is expected that the coverage will be expanded to all credits.

iii) Collateral registration

Ownership and other titles including security interests concerning real estate, including agricultural land, are registered, which means collateral system is in place. In addition, collateral of movable assets such as equipment, machinery and inventory must be registered in the National Collateral Registry (NCR). The contents of the registration include the contents of the collateral setting agreement. Private companies as well as financial institutions can refer to the registered information, and it can be used not only for concluding and managing collateral agreements, but also as reference information for commercial transactions. According to interviews with CBN, registration with the NCR is deemed to satisfy perfection against a third-party.

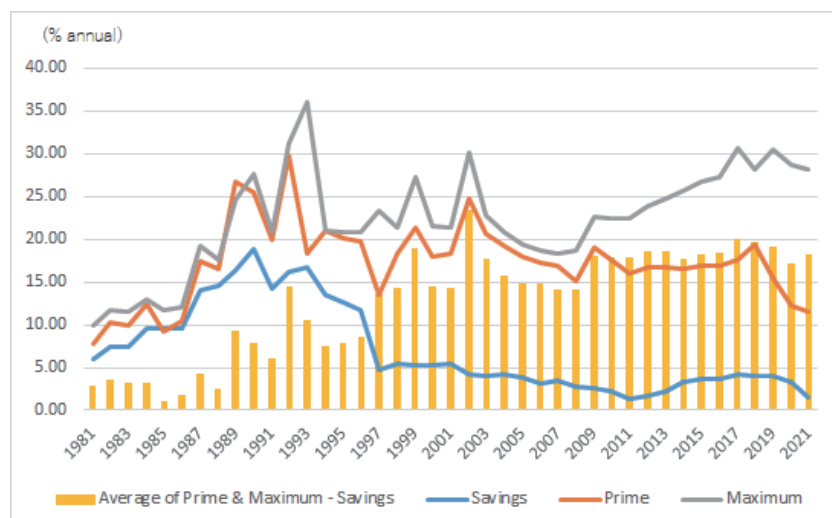
As for the issue of farmland collateral, many small-scale farmers do not register their title of their farmland. The registration of the title is necessary to use the farm land as collateral for borrowing from financial institutions. However, determination of the boundaries and cost to register discourages farmers to use the land as collateral. The reason why small-scale farmers do not register is that they have been farming on the relevant farmland as a custom for many years, and not only do they not feel the necessity or benefits of registration, but also the rights of farmland and the registration system itself are not known. CBN's agricultural finance program, which will be described later, did somehow to promote awareness among farmers by making farmland mapping a requirement.

On the other hand, one problem with the movable assets collateral system is that account receivables are not subject to registration. According to the interviews during the 1st onsite survey, average duration of account receivables is about 45 days, which implies there are sufficient merits in using it for finance by using the account receivables as securing assets. One of the interviewed startups is under development of "Invoice Factoring" in collaboration with one of the commercial banks. In this context,

it is expected that CBN include account receivables as subject of registration at NCR.

(3) Market and lending interest rate

Savings deposit interest rate used to be capped at 10% of the CBN Monetary Policy Rate (MPR), which is not formally required any more. CBN requires banks to report their deposit and lending rates and publishes monthly the aggregated statistics. Bank lending rates are published as standard interest rates, such as the Prime Lending Rate (PLR) which are applied to excellent lenders and the Maximum Lending Rate (MLR).



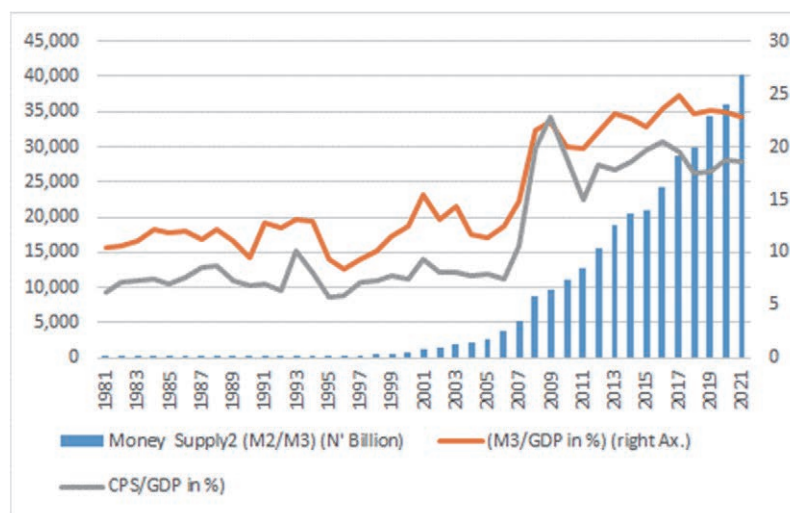
Source: Made by the survey team based on CBN, Statistics Bulletin

Figure 2-37 Historical lending and saving deposit interest rate of banks

The chart above shows the trends in Prime Lending Rate (PLR), Maximum Lending Rate (MLR), and savings deposit rates. PLR have been declining since 2019, reaching 11.55% in 2021, but the MLR remains high at 28.12% in 2021. Such high lending interest rates may raise the hurdles for potential borrowers even with a promising investment projects.

A simple calculation of interest margin which is subtracting the savings deposit interest rate from the average of PLR and MLR shows it remained above 15% since 2000. Although not shown in the figure, the interest margin calculated by subtracting one-year time deposits, rather than savings deposits, is also at a high level of 13.6% in 2021, which is quite large for a bank. As a result, return on total assets (ROA) is 2.3% and return on equity (ROE) is 25.8% (both in 2019), which are high levels for a bank.

The background behind the high interest rate is the size of the macro financial market is small at 22.9% of GDP (2021), and as a result, credit extended to the private sector is at a low level of 18.6% of GDP. It seems that the demand cannot be met.



Source: CBN, Statistics Bulletin

Figure 2-38 Money supply and credit to private sector as % GDP

Since 2022 onwards, interest rates in Nigeria are rising in response to the global trend of hikes in inflation and market interest rates. Furthermore, in 2023, domestic price increases accelerated due to the abolition of gasoline subsidies, and the policy interest rate (MPR) rose to 18.5% as of June (see table below).

Table 2-40 Recent market interest rates in Nigeria

	InterBank CallRate	MPR	SavingsDe posit	SixMonths Deposit	PrimeLend ing	MaxLendi ng
Jan-23	10.35	17.50	4.29	7.35	13.67	27.63
Feb-23	12.54	17.50	4.30	8.91	13.62	28.75
Mar-23	14.75	18.00	4.58	9.35	13.97	28.08
Apr-23	15.80	18.00	4.59	9.84	14.05	28.59
May-23	12.31	18.50	5.13	9.84	14.07	28.31
Jun-23	11.66	18.50	5.18	8.54	13.85	28.94

Source: CBN Website (<https://www.cbn.gov.ng/rates/mnymktind.asp>)

In banking practice, the short-term lending interest rate is calculated by adding a spread (profit margin) to the marginal funding cost. The spread depends on the creditworthiness of the borrower and the size of the loan amount (= administration and administrative costs). The most recent (June 2023) PLR of 13.85% is the level calculated by Interbank Call Rate of 11.66% plus about 2%, or the 6-month fixed deposit interest rate of 8.54% plus about 5%. This implies that a profit margin of 2% covers necessary costs but does not add value (credit costs + profits), and 5% is a level at which credit costs and minimum profits can be secured.

As mentioned above, market interest rates remain high in Nigeria because the size of the financial market is small. For this reason, the lending interest rate (market interest rate plus banks' margin) is even higher, making it difficult to secure profitability even for promising investment projects, including in the agricultural sector, which is a major issue in the financial sector.

(4) Organizations and programs on Agriculture finance

1) Overview

Among the banks and other financial institutions mentioned above, agricultural loans are mainly provided by private banks such as commercial banks and microfinance banks (MFBs), as well as the Development Financial Institutions (DFIs) funded by the government such as CBN and Federal Ministry of Finance. Among DFIs, institutions involved in agriculture-related financing (including farmers and other producers as well as agriculture-related businesses and companies such as suppliers and processors) include the Bank of Agriculture (BOA), the Bank of Industry (BOI), and Development Bank of Nigeria (DBN). In addition, credit unions also provide loans to their member farmers and micro, small and medium-sized enterprises (MSMEs) involved in agriculture related business.

The agricultural sector is risky due to irregular cash flow (seasonality and irregular period of investment recovery), long investment recovery periods, and risks of volatile natural conditions. In addition, small scale farmers would face more difficulties such as low profitability and low risk tolerance. This tends to add cost to banks in terms of monitoring and preparation for possible losses, which further makes finance of agricultural producers difficult. For this reason, many governments including Nigeria intervene in agricultural finance.

As an intervention that is being rolled out nationwide, there is an on-lending scheme (a system similar to TSL) in which the CBN, BOI, and DBN provide funds for loans at low interest rates to banks. This is the flow of funds shown by the colored line in the chart below.

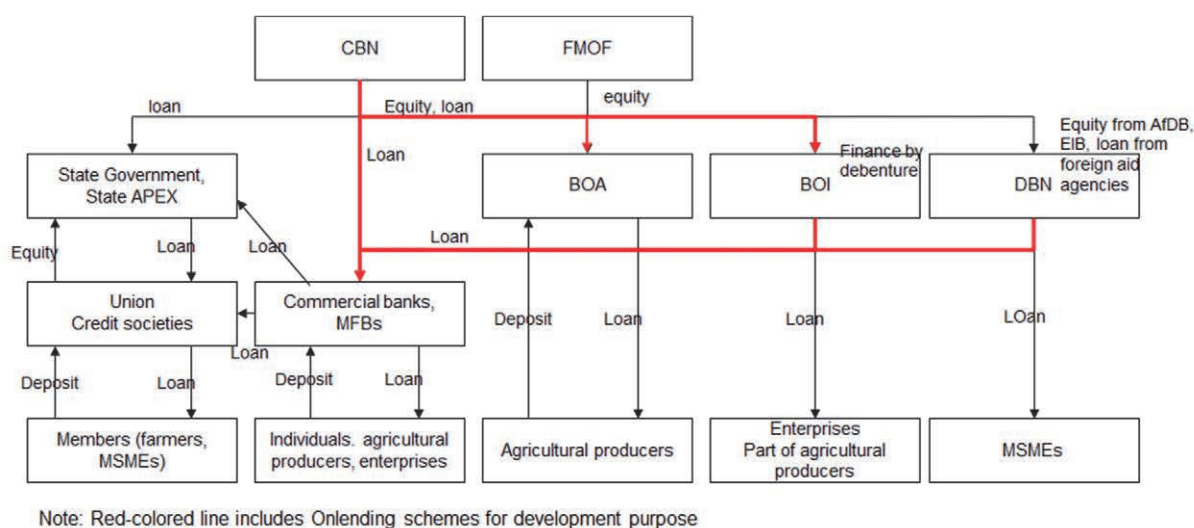


Figure 2-39 Chart Overview of providers of agricultural loans

BOI's on-lending is primarily funded by low-interest loans from the CBN, with some funds also received from overseas development financial institutions. DBN is a DFI established with investment from AfDB and EIB, and receives on-lending funds mainly from overseas development financial institutions. BOI's financing targets are companies and, in principle, farmers and agricultural producers

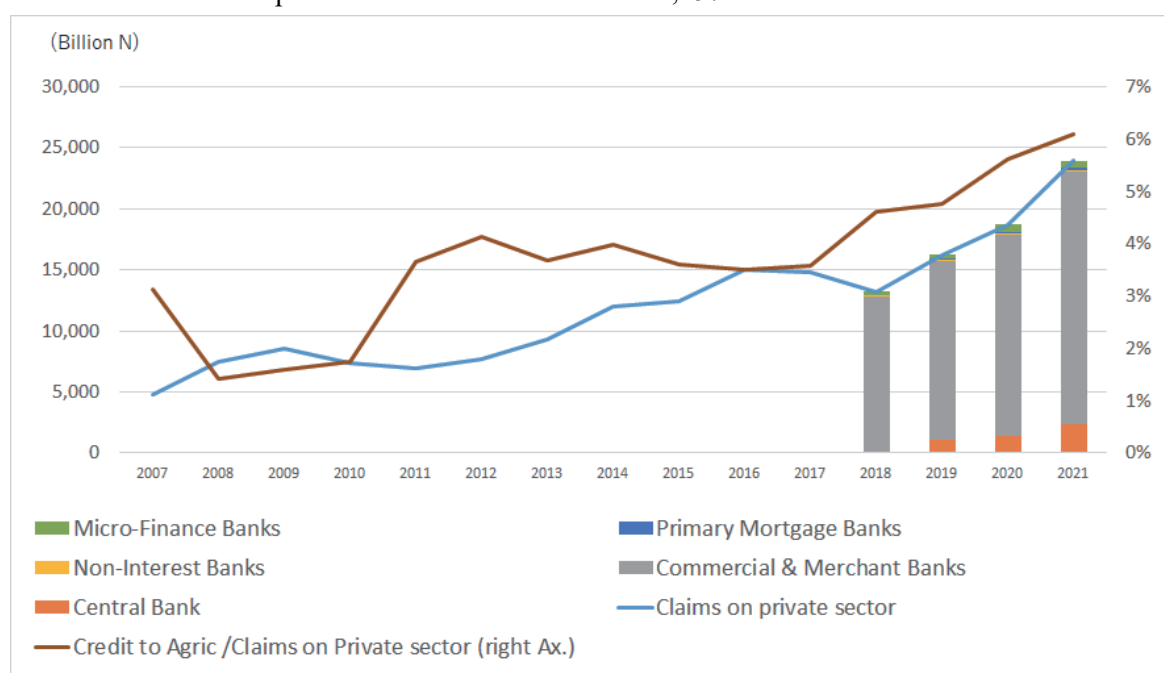
are not eligible. Furthermore, DBN's financing targets are small and medium-sized enterprises, and other companies and farmers are not eligible. On the other hand, BOA does not conduct on-lending, but instead provides loans directly to agricultural producers including farmers and MSMEs.

Another intervention method being availed nationwide is the agricultural credit guarantee scheme (ACGS). This shares bad debt losses for a certain percentage of the loan amount provided by private financial institutions. The ACGS is primarily used as a guarantee for loans to individual farmers.

2) Size of agricultural loans

Looking at the trends in credit to the private sector (see chart below), the growth has been accelerating since 2019, and the balance in 2021 was N 23,932 billion. Banks (Commercial Banks, Merchant Banks) account for the majority, followed by CBN. Microfinance Banks account for 2.2% and Non-Interest Banks (Islamic banks) account for only 0.8%.

At the same time, looking at trends in agricultural loans, the growth momentum has strengthened since 2018 partly thanks to the onlending loan programs provided by CBN, and in 2021 it accounted for 6% of the total credit to private sector with amount of N 1,457 billion.



Source: Made by the study team based on CBN, Statistics Bulletin

Figure 2-40 Historical credit to private sector and agriculture sector by Banks

The definition of agricultural loans is stipulated by the CBN, and includes loans for agricultural producers (purchase of inputs, investment in farm maintenance, agricultural machinery, post-harvest facilities, etc.), loans for livestock/dairy products, poultry farming, fisheries, etc. In principle, loans for companies specializing in food processing are not included⁶⁸.

⁶⁸ Definition of CBN's Agricultural Finance (Prudential Guideline 2010) is as follows:

3) Main actors in agricultural finance

As mentioned above, agricultural loans are mainly provided by commercial banks, MFBs, BOAs, and credit unions. On the other hand, CBN and BOI are institutions that indirectly support agricultural loans through on-lending schemes⁶⁹. In addition, there is the Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL), which is funded by the CBN and is an institution that implements the agricultural credit guarantee scheme. NIRSAL also provides advisory services regarding agricultural loans. Regarding agricultural insurance, the state-owned Nigerian Agricultural Insurance Corporation (NAIC) provides agricultural insurance and subsidized insurance. NAIC's insurance instruments are often provided agricultural loans in a package, especially government loan programs (on-lending and agricultural credit guarantees)⁷⁰. Overview of each of these institutions will be described.

i) Central Bank of Nigeria (CBN)

Regarding the TSL considered in this survey, the CBN is likely to play a role as an implementing agency that provides funds to PFI.

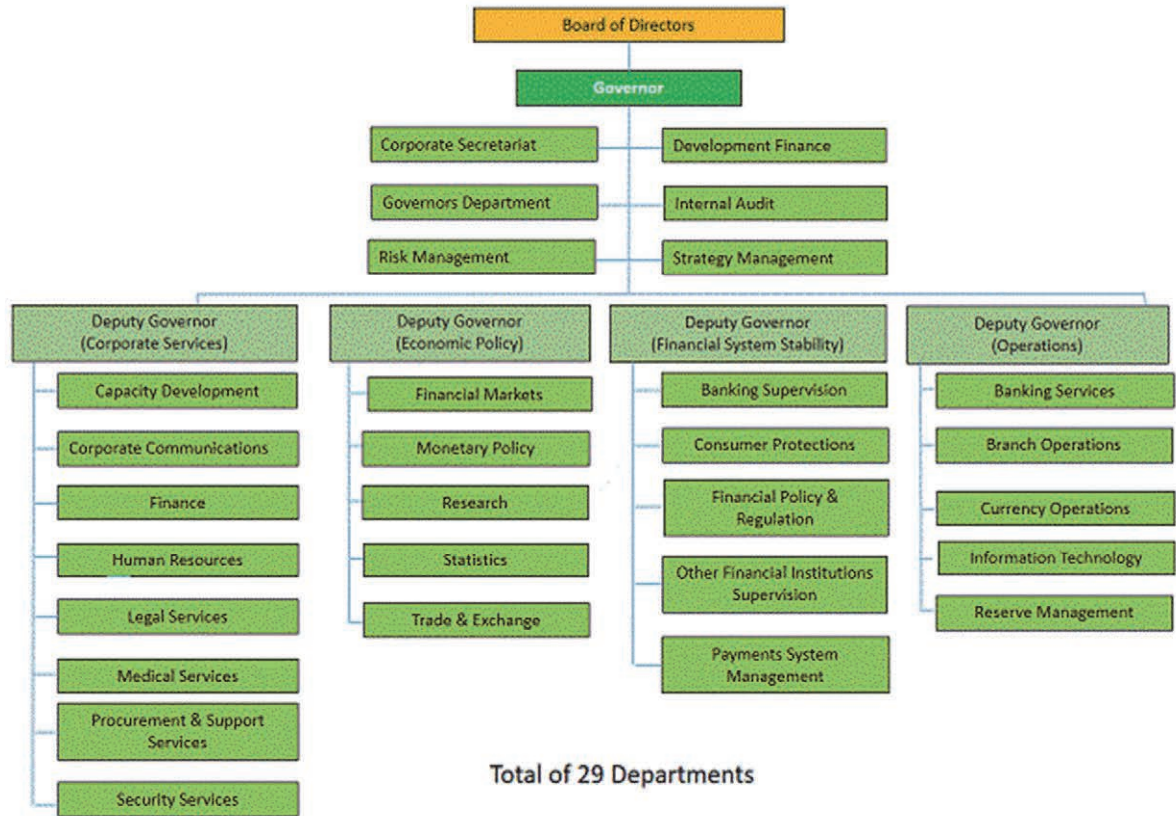
a) Organization of the Central Bank of Nigeria (CBN)

Based on the CBN Act, CBN executes the authority of supervising banks, monetary policy as well as its own banking functions to achieve five objectives, such as to stabilize currency and prices, issue currency, manage foreign exchange reserves, promote a sound financial system, and provide banking services to the federal government. The CBN organization consists of 5 Directorates and 29 Departments. Of these, development finance, including agricultural finance, is under the scope of the Development Finance Department (DFD) of the Governors' Directorate.

Agricultural finance are categorized as Farm Credit and Non-farm credit. Farm Credits includes production loans, farm development finance, finance for the purchase of agricultural machinery, and non-fund based facility such as letters of credit. Non-farm credit includes financing for livestock such as dairy, poultry and fisheries. Agriculture financing shall not include loans to traders and intermediaries engaged in trading/processing of agricultural commodities. However, agricultural financing can be extended to entities (including corporate farms, partnerships and individuals) engaged in farming activities as well as processing, packaging and marketing of mainly their own agricultural produce, provided 75% of the agriculture produce being processed, packaged and marketed should be produced by the above-mentioned entities themselves.

⁶⁹ BOI's support targets are companies, but it also includes investments in agricultural machinery, livestock farming, and fisheries. On the other hand, the DBN targets micro, small and medium-sized enterprises, including processors in rural areas, but does not cover agricultural loans (primarily for agricultural producers) as defined by the CBN.

⁷⁰ Previously, the package was mandatory, but now it is optional.



Source: CBN Website

Figure 2-41 Organization of CBN

DFD comprises the following 6 divisions. Among them, Retail Agriculture Credit Department is in charge of Anchor Borrower Programme (ABP) which is described later.

- Retail agriculture credit
- Commercial agriculture credit
- MSME credit
- Multi-sectoral finance
- Recovery & support service
- Relationship and advocacy

In addition, there are five units which specialized in some functions such as strategy/policy, inter-regional cooperation, promotion of financial inclusion, and general affairs. There are about 250 people in total of DFD.

b) On-lending programs

Whole picture of on-lending programs

CBN conducts many on-lending program loans. In addition to agriculture, policy objectives include improving corporate productivity, supporting MSMEs, supporting bank agents (businesses that carry out banking operations in rural areas to supplement branches which are very few in rural areas), and

promoting industries in non-oil fields. The table below provides an overview, including the on-lending loans implemented by BOI and DBN on top of CBN.

Table 2-41 Overview and balance of on-lending program loans by CBN and DFI (as balances at PFI banks at the end of 2021)

Provided by	Program	Overview of program					Balance (N billion)
		Objective	Target	Interest rate	Tenor	Others	
CBN	Anchor Borrowers' Program (ABP)	Started in 2015. With the intention of increasing the production of rice and other crops for stabilizing food price and import substitution.	Providing production funds to farmers, companies, associations/cooperatives, and state government that aggregate farmers.	CBN lend to PFI at an annual interest rate of 2%, and PFI will lend to the borrower at 9%.	For duration of farm production	CBN share loss up to 50% of PFI's bad debt losses.	299
	Commercial Agriculture Credit Scheme (CACS)	Started in 2009. The aim is to expand agricultural production and the production of farmers by promoting the growth of agricultural VCs.	Working capital and fixed asset investment funds for agricultural VC companies and State government.	CBN will lend to PFI at an annual interest rate of 2%, and PFI will lend to the borrower at 9%.	Up to 7 years, as a rule	The deadline is 2025 to collect all loans. Amount is up to N2 billion for businesses and N1 billion for State governments.	241
	Accelerated Agricultural Development Scheme (AADS)	Targeting two competitively superior crops determined by the state government.	State government	CBN to PFI at 2% annual interest, and PFI to the borrower at 9%.	Maximum 3 years (grace period 2 years).		11
	Private sector led accelerated agriculture development scheme (P-AADS)	A program aimed at youth employment as a complement to AADS.	State government	CBN to PFI at 2% annual interest, and PFI to the borrower at 9%.	Maximum 5 years (grace period 2 years).		2
	Real Sector Support Facility (RSSF)	Started in 2014. The aim is to increase production, improve productivity, and increase employment in the manufacturing industry,	Working capital and fixed investment funds of enterprises	CBN to PFI at 2% annual interest, and PFI to the borrower at 9%.	7 to 10 years (grace period: 2 years).	Loan amount cap is N10 billion	180

Provided by	Program	Overview of program					Balance (N billion)
		Objective	Target	Interest rate	Tenor	Others	
		agricultural VC, and some service industries.					
	RSSF Differentiated Cash Reserve Scheme Requirement Scheme (DCRR)	Started in 2018. Among the above RSSFs, this program support large companies and startups.	Working capital and fixed investment funds of enterprises	CBN to PFI at 2% annual interest, and PFI to the borrower at 9%.	7 to 10 years (grace period: 2 years).	Loan amount cap is N10 billion	446
	Health Intervention (HSI) Differentiated Cash Reserve Scheme Requirement Scheme (DCRR)	For the health sector of the above DCRR.	Working capital and fixed investment funds of enterprises	Same as above	Same as above		17
	MSMEDF	Support small and medium-sized enterprises with low interest rates.	Working capital and fixed investment funds of micro, small and medium-sized enterprises	CBN to PFI at 2% annual interest, and PFI to the borrower at 9%.	Maximum 5 years (1 year for working capital).		99
	State Bailout Funds	Support the state government's financing (salary payments, etc.).	State government	CBN to PFI at 7% annual interest, and PFI to the borrower (state government) at 9%.	Maximum 20 years.		186
	Salary Bailout facilities	Helping state government pay salaries.	State government	CBN to PFI at 2% annual interest, and PFI to the borrower (state government) at 9%.	Maximum 20 years.		198
	SANEF (Shared Agent Network Expansion	Aims to expand agent networks and increase	CBN-licensed mobile money	2% annual interest rate from	10 years (1 year interest payment		3

Provided by	Program	Overview of program					Balance (N billion)
		Objective	Target	Interest rate	Tenor	Others	
	Facility) Intervention Fund	financial inclusion.	operators and large bank agents	CBN to the bank. 9% to agents etc.	grace period, 2 year principal grace period).		
	Non-oil Stimulation (NESF)	The purpose is to promote exports other than oil in order to move away from dependence on oil.	Non-oil sector enterprises	CBN to PFI at 2% annual interest, and PFI to the borrower at 9%.	Maximum 10 years.	CBN purchased N500billion of bonds issued by Nigerian Export-Import Bank (NEXIM).	43
	Creative Financing Initiative Fund (CIFIF)	Support creative businesses	IT, fashion, movies, and music enterprises	CBN to PFI at 5% annual interest, and PFI to the borrower at 9%.	Maximum period is 10 years (grace period is 2 years).		2
	Excess Crude Account (ECA)-Secured Loans Fund	The funds in the Excess Crude Account will be used as a safeguard to provide loans to the state government.	State government	CBN to PFI at 2% annual interest, and PFI to the borrower (state government) at 9%.	Maximum 20 years.	Repayments will come from grants from the federal government to state governments.	139
CBN total							1,866
BOI	Small and Medium Enterprise Refinancing and Restructuring Fund (SMERRF)	Provide funds for restructuring small and medium-sized enterprises' debt.	Restructuring of SMEs' debt	PFI provides loans to borrower companies at an annual interest rate of 10%.	The period is 5 to 7 years.		5
	Power & Aviation Funds (PAIF)	Funds for restructuring power and aviation loans.	Power and aviation enterprises	BOI will lend to PFI at an annual interest rate of 2%, and PFI will lend to the borrower at 9%.	The maximum period is 15 years.	The source of funds is bonds issued by BOI and purchased by CBN.	28
	Power and steel	For restructuring power, steel and metal industry	Enterprises of power, steel and	PFI provides loans to borrower	The maximum period is 15		10

Provided by	Program	Overview of program					Balance (N billion)
		Objective	Target	Interest rate	Tenor	Others	
			metal industry	companies at an annual interest rate of 7%.	years.		
	Manufacturing Intervention Fund	For restructuring small and medium-sized enterprises' debt.	Restructuring of SMEs' debt	PFI provides loans to borrower companies at an annual interest rate of 7%.	The maximum period is 15 years.		141
BOI total							
DBN	Support MSMEs	Provide concessional financing for small and medium-sized enterprises. It seems that each bank is conducting on-lending under individual conditions, rather than a specific program.	SMEs	Conditions for First City Monument Bank: PFI lends funds to borrowers at 9.76% - 11.76%.	Same as left: The maximum term is 10 years (3 years for working capital). The PFI spread will be set at 6%.	Margin spread of PFI is set at 6%.	185
Total of CBN, BOI and DBN							
							193
							2,245

Source: Annual reports of 14 of the 24 commercial banks for which detailed information is disclosed.

Note: Interest rates have been reduced since 2020 as a countermeasure against COVID-19. For example, in CBN on-lending, the interest rate conditions of 2% from CBN to PFI and 9% from PFI to the borrower have been reduced to 1% and 5%, respectively.

Of these, CBN's ABP, CACS, AADS, and P-AADS are agricultural-related loans (for producers and agricultural VC businesses). It is also assumed that RSSF and DCRR include some agricultural-related loans. The largest loan programs supporting agricultural loans are ABP and CACS. Below is an overview of these two programs and the challenges (lessons learned).

Anchor Borrowers' Program (ABP)

The reason behind the start of ABP in 2015 was to increase rice production, which at the time was about 40% dependent on imports, to reduce dependence on imports, and to curb food price increases. It was also consistent with the policy of improving agricultural productivity by promoting the formation of agricultural VCs.

In order to strengthen its policy of increasing rice production, the federal government effectively banned rice imports at the same time as ABP. However, while the embargo would have an immediate effect, it would take time to increase rice production, which is thought to have prompted unreasonable loans to compensate for the decline in imports.

ABP witnessed some loans given to unsubstantiated farmer groups, loans based on farm land reported larger cultivated land than the actual amount, and some loans not completed in time for the farmers' production period. Those caused difficulties and/or unwillingness of farmers to repay the loan. The International Monetary Fund (IMF), in its report on Nigeria (NIGERIA SELECTED ISSUES, January 12, 2023), points out that ABP has only recovered 24% of the amount disbursed⁷¹. On the other hand, CBN says that 52.4% has been recovered⁷².

To address these issues, three years after its launch, the CBN established guidelines requiring target farmers to register their IDs and map their cultivated land using GPS. In addition, since it is difficult for PFI to monitor each small-scale farm, especially for commercial banks with few branches in rural areas, anchor companies act as borrowers or guarantors and are responsible for repayments from farmers. As a result of these measures, the non-repayment ratio has decreased since the introduction of the guidelines, with many banks now below 5%, which is a level of NPL ratio required by CBN.

As a unique support measure as compared other on-lending programs, ABP allows the CBN will bear 50% of the loss in the event of non-repayment (after recovery efforts). According to interviews with banks, it is likely that such excessive support caused moral hazard among borrowers and PFIs.

In addition, farmers' low financial literacy appears to have exacerbated the problem. According to the banks and start-up companies interviewed, many farmers who received loans, especially in the first three years, misunderstood that the loans were grants that did not require repayment because they believed they were provided with funds by the CBN. Additionally, when ABP was launched, farmers were required to form a group to cooperate together with less awareness and mind-setting for commercial

⁷¹ Recent data (November 2020) from the central bank indicate that the repayment rate for the Commercial Agricultural Credit (CAC) Scheme is at almost 66 percent but, since the loans started in 2009, this is not a particularly high outcome. For the Anchor Borrowing Program, repayment is also low at 24 percent, especially since repayment can be made in kind, thereby limiting the tenor of the loans to one year. Part of the problem is that the incentive structure for repayment is weak, the recipient loans are not always well targeted and occasionally the funding is used for other purchases (e.g., new agricultural input trading companies to elicit trading rents).

⁷² <https://guardian.ng/business-services/cbn-disburses-fresh-n39-36-billion-under-abp-other-interventions/>

value chain.

The following is explanation of ABP based on the 2021 version of the ABP guidelines.

In order to support the production of target crops (described below), CBN provides finances borrowers to purchase agricultural inputs through participating financial institutions (PFIs). In addition, various stakeholders will form a Project Implementation Team (PIT) for each project in order to provide the necessary support for production activities as a package. PIT will first hold a Town Hall Meeting to agree on a business plan (Economics of Production (EoP)), and thereafter promote and coordinate business operations in line with the agreed EoP.

PFI serves as the PIT leader (Chairman). The Co-chairman is assumed to be an anchor, the entity responsible for setting up the farmer group and purchasing the harvested crops. There are three models defined depending on the type of that entity. On top of the PFI and an anchor, PIT is comprised of the CBN (Development Finance Officer, DFO, of CBN branch in the relevant State), the state ADP, farmer group representatives, and insurance companies that provide agricultural insurance.

The roles of each stakeholder are partially different depending on the three models, so a system diagram for each model is provided below.

<Prime Anchor Model>

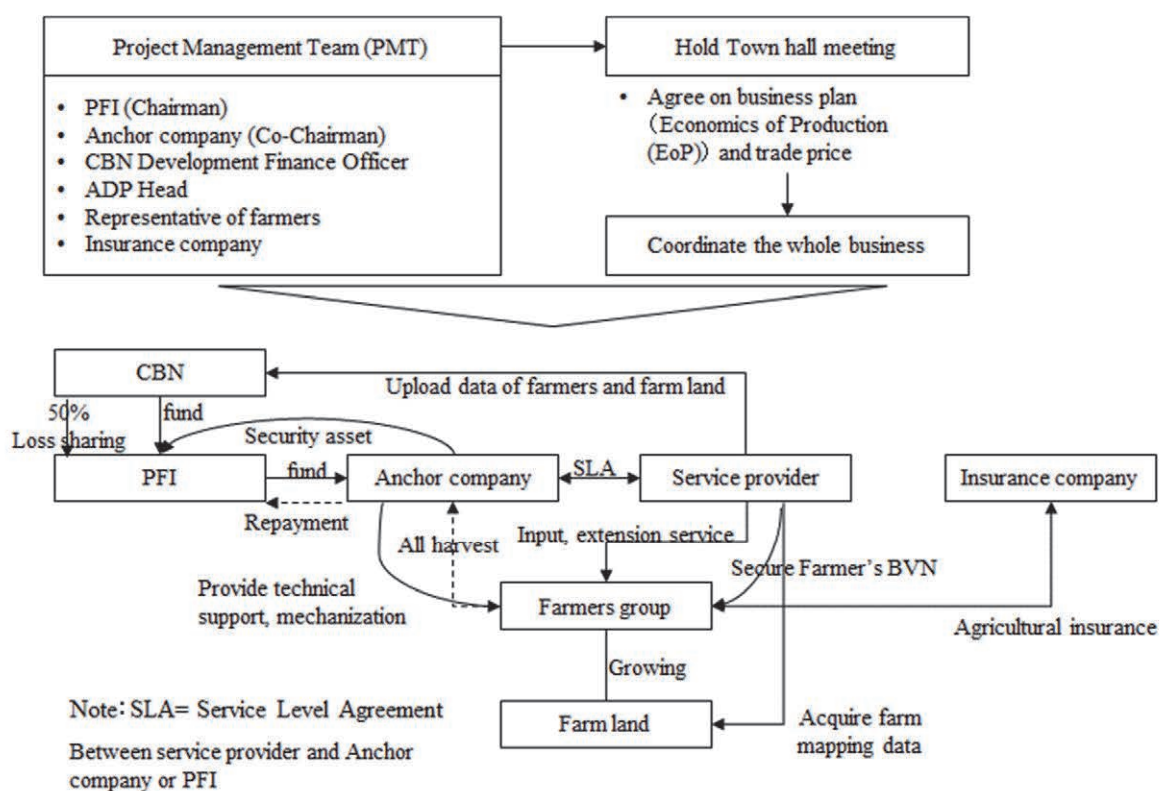


Figure 2-42 Organizational structure of ABP's Prime Anchor Model

Anchor companies are off-taker companies that include processing companies, and are responsible for setting up a farmer group and purchasing all the produce. Anchor companies also become debtors of

loans from PFI, receive funds, use them to purchase agricultural materials and services necessary for farmers' production activities, and take full responsibility for repayments. Anchor companies are obligated to provide collateral assets required by PFI. Regarding the loan agreement, PFI, the anchor company, and the farmers group will enter into a tripartite agreement.

In addition to providing production guidance and mechanization services to farmers, anchor companies conclude Service Level Agreements (SLAs) with service providers (Alternatively, PFI and service providers may conclude such agreements). Service providers secure agricultural inputs, provide extension services to farmers, obtain farmers' biometric information and bank account numbers, BVN, and farmland mapping data, and upload farmers' data and farmland data to the CBN system. On the other hand, insurance companies conclude agricultural insurance contracts with farmers.

After harvesting the crops, the farmers group is obligated to ship the entire harvest to the anchor company. After receiving the crops, the anchor company repays the loan principal and interest to PFI. If loan repayments are delayed and PFI incurs a loss, the CBN will compensate 50% of the loss at maximum.

<Commodity Association / Cooperative Model>

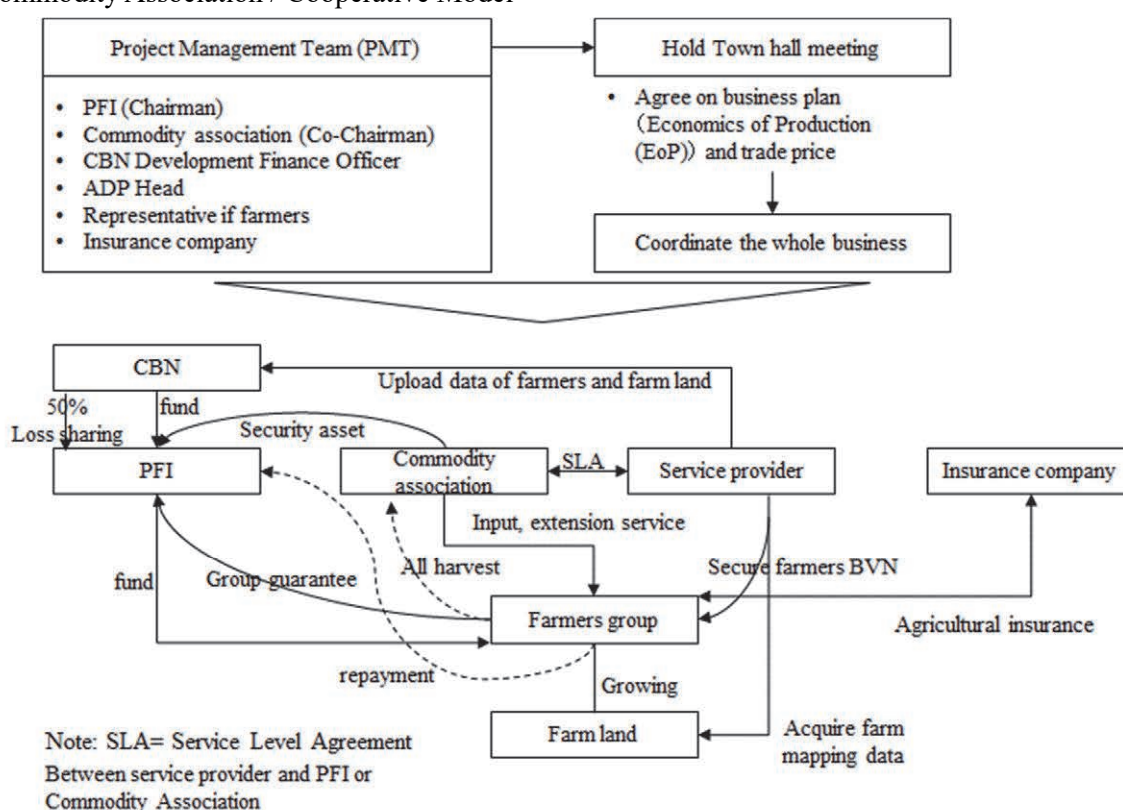


Figure 2-43 Organizational structure of ABP's Commodity Association / Cooperative Model

Commodity associations or agricultural cooperatives are responsible for setting up farmers group and purchasing their crops. A major difference from the prime anchor model is that the obligors of loans from PFI are farmers, and commodity associations/cooperatives collect collateral of farmers' borrowing,

including mutual guarantees among the farmers. Regarding the loan agreement, PFI, commodity associations/cooperatives, and farmers will enter into a tripartite agreement. .

In addition to securing agricultural materials and providing extension services, commodity associations/cooperatives also sign SLAs with service providers (Alternatively, PFI and service providers may also sign SLAs), and service providers use the above-mentioned farmers' data and farmland data, then submit it to CBN.

Farmers are obligated to raise at least 10% of the necessary funds for purchasing agricultural inputs, etc. with their own funds, then borrow the remaining amount. They shall apply the borrowed money to production, and ship the entire harvest to the association/cooperative. .

If loan repayments are delayed and PFI incurs a loss, the CBN will compensate 50% of the loss at maximum. The roles of insurance companies, PFI and CBN are similar to the prime anchor model.

<Public Sector (State Government) Model>

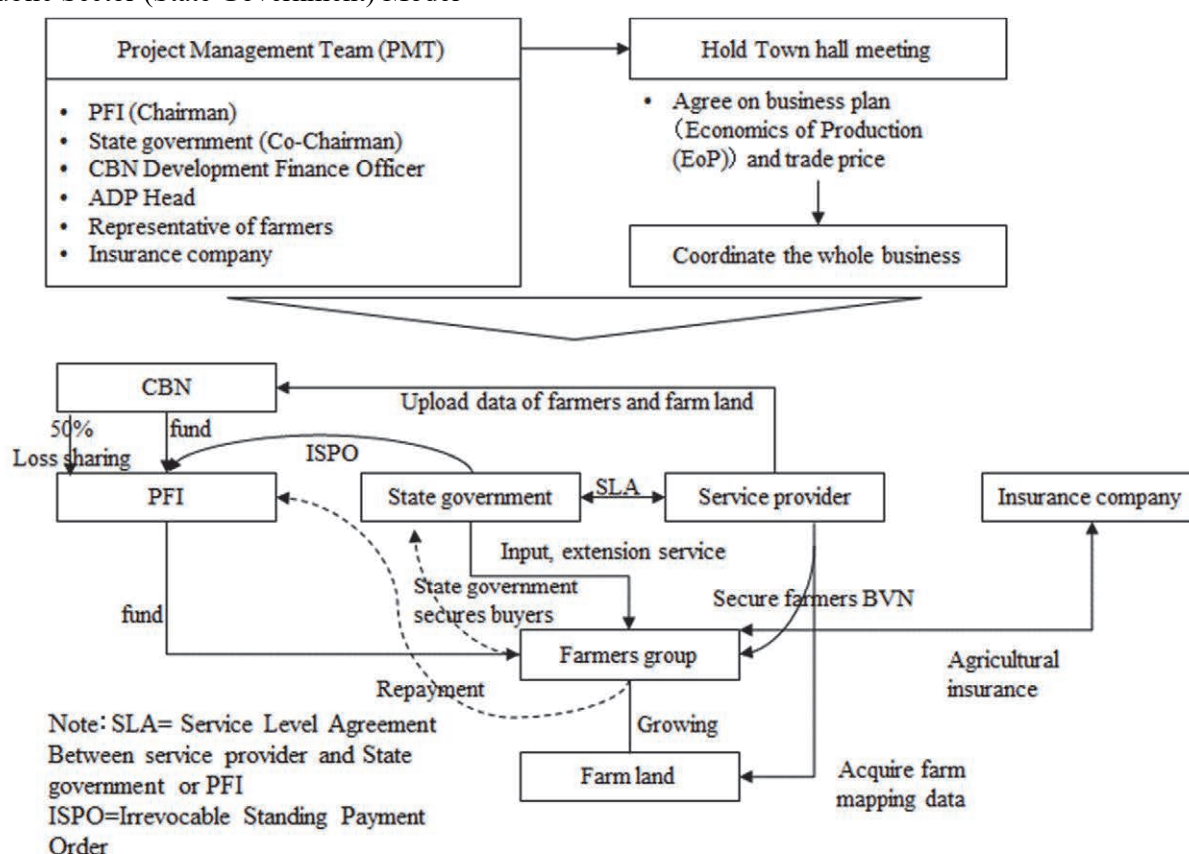


Figure 2-44 Organizational structure of ABP's Public Sector (State Government) Model

The state government sets up farmers group and decide on purchasing companies. The debtors of PFI loans are farmers, but in a major difference from the commodity association/cooperative model, the state government guarantees 100% of farmers' repayments. The state government pledges an Irrevocable Standing Payment Order (ISOP) to PFI as security for farmers' loans.

In addition, the state government secures agricultural inputs and provides extension services, and also

concludes SLAs with service providers (Alternatively, PFI and service providers may also conclude SLAs), and service providers acquire the above-mentioned farmers' data and farmland data, then submit the data to the CBN.

Farmers must raise at least 10% of the necessary funds for purchasing agricultural inputs, etc. with their own funds, then borrow the remaining amount, apply the borrowed money to production, and ship the entire harvest to a buyer designated by the state government.

If loan repayments are delayed and PFI incurs a loss, the CBN will compensate 50% of the loss at maximum. The roles of insurance companies, PFI and CBN are similar to the prime anchor model.

The stakeholders and their roles have been explained for each of the three models above, but other stakeholders may include the state government, FMAFS, research institutes, Federal Ministry of Water Resources, Federal Ministry of Industry, Trade and Investment and development partners, etc. as examples depending on the actual situation of each project. A summary of ABP's objective, target projects, loan conditions, etc. is summarized in the table below.

Table 2-42 Outline of ABP Scheme

Items	Outline
Objective	Promote linkages between small-scale farmers and processors to expand agricultural production and stabilize food prices. In particular, it aims to achieve the objectives through: - Increase in agricultural VC financing by banks - Food import substitution - Promote smart agriculture - Transformation of smallholder farmers from subsistence farming to commercial farming.
Source of funds	CBN provides on-lending funds to participating financial institutions (PFIs).
Target project	ABP supports production of the following commodities 1. Cereals (Rice, Maize, wheat etc.) 2. Cotton 3. Roots and Tubers (Cassava, Potatoes, Yam, Ginger etc.) 4. Sugarcane 5. Tree crops (Oil palm, Cocoa, Rubber etc.) 6. Legumes (Soybean, Sesame seed, Cowpea etc.) 7. Tomato 8. Livestock (Fish, Poultry, Ruminants etc.) 9. Any other commodity that may be decided upon by the Bank from time to time.
PFI	- Deposit Money Banks (DMBs); - Development Finance Institutions (DFIs); - Non-Interest Banks; and - Microfinance Banks (MFBs).
Borrower	- Prime Anchor Model: Anchor company - Commodity Association / Cooperative Model: Farmers - Public Sector (State Government Model): Farmers
Eligible farmers	Must be a member of a farmers group, have an account with PFI, provide a bank verification number (BVN), and contribute at least 10% equity (own funds or in-kind contribution).
Eligible anchor	Must be a processing company or off-taker company registered with CAC; Must have the ability to purchase the entire harvest from farmers; Must designate a PFI to cooperate with in implementing ABP; Must identify valid farmland for ABP production;

Items	Outline
Loan amount	There is no explicit upper limit, but it is determined by EoP.
Interest rate	Loans from CBN to PFI have an annual interest rate of 2%. The interest rate on loans from PFI to borrowers is 9% per annum.
Tenor	The period corresponding to the period from purchasing agricultural materials to harvesting and shipping for each target crop.
Collateral	- Prime Anchor Model: Depend on requirement of PFI - Commodity Association / Cooperative Model: Mutual guarantees among farmers, other guarantees, agricultural land, assets that can be registered in the NCR. - Public Sector (State Government Model): ISPO
Risk sharing	The CBN will bear 50% of the loss, but the CBN may further share the loss burden with other parties. If PFI is at fault, PFI must pay the full amount.

Note: The Corporate Affairs Commission (CAC) was established in 1990 under the Companies and Allied Matters Act, and took over the business and establishment registration services previously carried out by the Ministry of Commerce and Tourism under the Companies Act. Anyone can search for registered companies and register new companies online on the CAC website. There are no special conditions for registration.

Source: Anchor Borrowers' Programme (ABP) Guidelines, CBN Annual Report 2019, CBN Website

Execution and repayment of loans under ABP scheme is implemented along the following steps. .

1. Anchor (anchor companies, commodity associations or cooperatives, State government) submits an expression of interest to PFI.
2. PFI submits an expression of interest to CBN.
3. PFI submits information of farmers and farm land to CBN.
4. PFI and Anchor lead the forming of PMT.
5. PMT shall hold a town hall meeting and agree on EoP including products and purchase prices.
6. PFI, Anchor and Farmers shall sign a triparty contract.
7. The service provider in terms of IT maps (tagging) the farmland.
8. PFI submits a loan application to CBN
9. CBN releases the fund after CBN confirms the application meets the ABP's requirements and the process is compliant with ABP's rules.
10. PFI registers farmers and the products with NCR.
11. PFI disburses funds to accounts of the borrower (anchor companies or farmers).
12. PFI ensures that input suppliers and service providers receive their proceeds and chargers (PFI shall disburse the funds to the farmers with amount after deducting payments to input suppliers and service providers).
13. PFI, the anchor, DFO of CBN shall report to DFD of CBN with required format and frequency.
14. The borrower shall repay the principal and interest of the loan to PFI, and PFI prepay to CBN.

Commercial Agriculture Credit Scheme (CACS)

CACS was launched in 2009. The policy objective is to promote investment by providing low-interest investment funds to agricultural VC companies, thereby boosting food security and curbing food price increases.

While PFIs of ABP provides working capital (input materials) to agricultural producers by season, PFIs of CACS provides both working capital and fixed investment capital not only to agricultural producers but also to a wide range of value chain participants such as processors including companies and cooperatives. The conditions of lending allow larger amount and longer tenor (7 years). As for cooperatives, State government borrow the loans from PFI and relends the funds to cooperatives.

CBN headquarter directly manages the CACS operation. Committee of Governors comprising Governor and Deputy Governors supervises the CACS and DFD is in charge of practical operation. CBN provides funds through PFIs to enterprises or State governments. The borrower enterprises perform agriculture related projects such as agricultural production, purchase, processing and sales of commodities, production and sales of agricultural materials by using the loan proceeds. On the other hand, the borrower State governments relend the borrowed funds to agricultural cooperatives which shall perform the agriculture related projects.

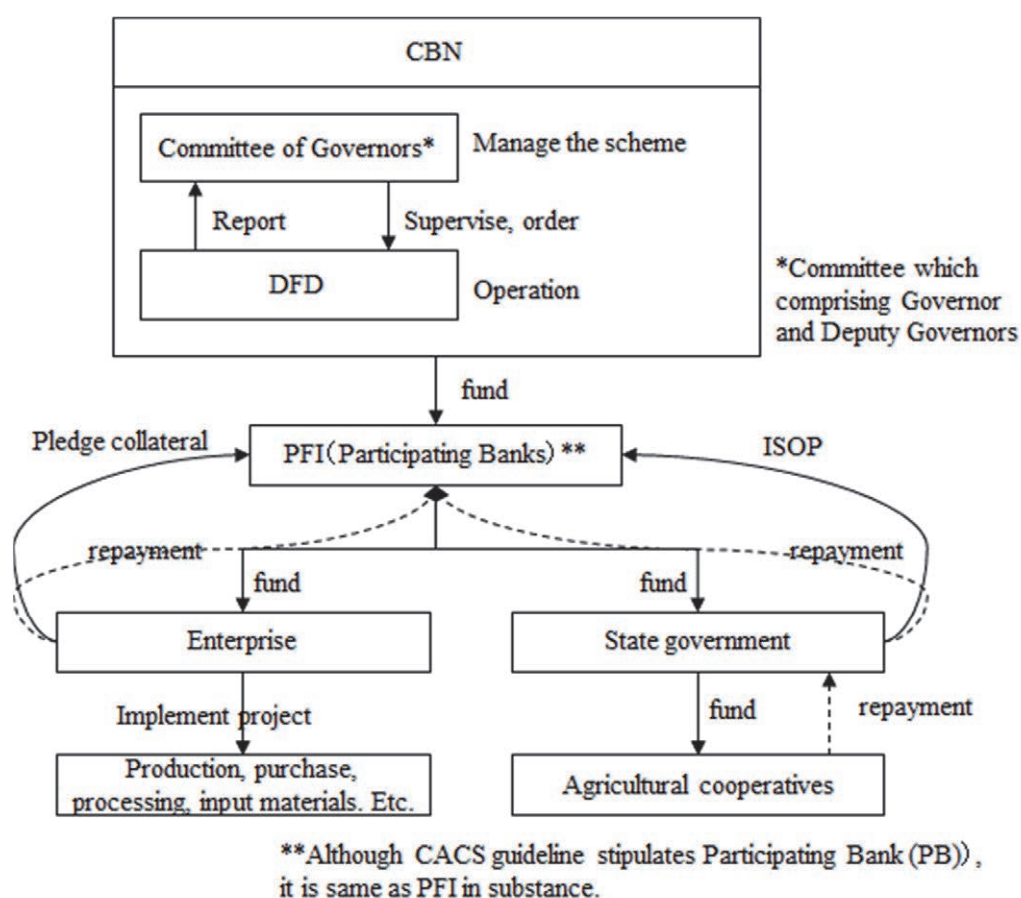


Figure 2-45 Organizational structure of CACS

The following table shows outline of CACS.

Table 2-43 Outline of CACS Scheme

Items	Outline
Objectives	- By providing credit facilities to commercial agricultural enterprises at a single digit interest rate. Enhance national food security by increasing food supply and effecting lower agricultural product prices, thereby promoting low food inflation. - Reduce the cost of credit in agricultural production to enable farmers exploit the potentials of the sector. - It is also positioned to complement intervention systems for small-scale farmers (ACGS, etc.) and strengthen financial support for VC as a whole.
Source of funds	- The scheme was originally financed from the proceeds of the N200billion three (3) year bond raised by the Debt Management Office (DMO). - CBN currently finances to the scheme.
Target projects	PRODUCTION: - Cash Crops: Cotton, Oil Palm, Fruit Trees. Rubber, Sugar Cane, Jatropha Carcus and Cocoa. - Food Crops: Rice, Wheat, Cassava, Maize/Soya, Beans/Millet, Tomatoes and Vegetables - Poultry: Broilers and Eggs Production - Livestock: Meat, Dairy and Piggery - Aquaculture: Fingerlings and Catfish PROCESSING: - Feed mills Development, Threshing, Pulverisation and Other forms of transmutation for value addition STORAGE: - Commodities, Agro-Chemicals and Warehousing FARM INPUT SUPPLIES: - Fertilizers, Seeds/Seedlings, Breeder Stock, Feeds, Farm equipment & Machineries. MARKETING: - Agricultural commodities under the focal investment areas.
PFI	Any deposit money banks which CBN designates
Borrower	Enterprise - Large scale enterprises: Be a limited liability company with asset base of not less than N100 million and having the prospect to grow the net asset to N250 million in the next three years, etc. - Medium scale enterprises: Be a limited liability company with asset base of not less than N50 million and having the prospect to grow the net asset to N150 million in the next three years, etc. State government - State government and FCT may borrow from PFI to relend to agricultural cooperatives and farmers groups.
Loan amount	- Enterprise: up to N 2 billion; State government: up to N 1 billion
Interest rate	- CBN to PFI: 2% annual interest rate - From PFI to companies and state governments: annual interest rate of 9% or less.
Loan Tenor	- Gestation period of the project plus three years cash flow allowance. Up to 7 years. - Working capital facility of one year with provision for roll over. - All loans and overdrafts shall terminate on September 30, 2025.
Collateral	- Loans from PFI to enterprises: Enterprises provide the collateral required by PFI.

Items	Outline
	- Loans from PFI to the State government and then to agricultural cooperatives, etc.: The state government provides ISOP to PFI and guarantees repayment (regardless of repayment from agricultural cooperatives, etc.).

Source: GUIDELINES FOR COMMERCIAL AGRICULTURE CREDIT SCHEME (CACS)

Regarding CACS, the CBN's Statistics Department conducts post-surveys and prepares evaluation reports. According to the report, a total of N147.87 billion was disbursed to 191 borrower between 2009 and 2016. By organizational type, 151 borrowers, 77.6% of the amount, went to stock companies, and 14 borrowers, 11.1% of the amount, went to government agencies. By state where the organizations targeted for financing are located, Lagos (13.2%), Kano (9.9%), Oyo (9.2%), and Adamawa (7.3%) ranked high in terms of amount ratio. By industry and investment purpose, the top targets are shown in the table below.

Table 2-44 Disbursed CACS loans by industrial sectors

Industry	Borrowers	Share of amounts
Agricultural production	85	43.7%
Poultry	44	16.6%
Food processing	28	19.9%

Source: CBN, "Commercial Agriculture Credit Scheme Evaluation and Impact Assessment Report"

Table 2-45 Disbursed CACS loans by investment purpose

Purpose	borrowers	Share of amounts
Livestock	36	10.7%
Crop production	28	14.8%
Distribution of seeds, fertilizers, and pesticides	23	16.9%
Grain/feed processing	11	6.3%
Livestock related services (excluding veterinary)	11	5.5%
Other food processing	10	6.4%
Fisheries	7	0.6%

Source: CBN, "Commercial Agriculture Credit Scheme Evaluation and Impact Assessment Report"

The evaluation report states that for companies involved in agricultural production, production increased by 21.09% per year, which far exceeded the 4.55% annual increase in real GDP in the agricultural sector. It is evaluated that there has been an effect such as an increase in the number of employees and corporate assets. On the other hand, 33 respondents (19.8% in terms of loan amounts) are not confirmed that the funds were used for agriculture-related purposes, and pointed out that there may have been a certain degree of use for other purposes.

The following cases were pointed out as other issues.

- In some cases, the business plan was sloppy. There was a mismatch between financing and business planning.

- Due to delays in disbursing funds, the rain-fed cultivation production plan could not be fulfilled.
- There were issues with banks' timely information collection and monitoring.
- In cases where the state government was the borrower and no specialized department was established to separately manage CACS funds, it is thought that political interference led to the funds being used for other purposes. In these cases, sufficient data could not be obtained in the ex-post evaluation survey.

On the other hand, the following points were pointed out as suggestion and recommendation.

- In cases where the state government is the borrower, the state government establishes a specialized department (Special Purpose Vehicle, SPV) for CACS, and the specialized department disburses funds and collaborates with extension activities, which resulted in effective use of funds benefitting end user farmers. It is recommended to confirm the state government's project plan and ensure monitoring during project implementation.
- There were cases where CACS funds led to the development of new VCs by entering new businesses and new crops. However, PFI loan officers are not always aware of these business opportunities, and resulting in failure to fully utilize the business potential. When loan officers visit producers and businesses, they should understand potential opportunities and propose financing options that will realize those opportunities.

Additionally, according to the Ministry of Agriculture in the FCT, the state government raised funds through CACS under a scheme that ISOP is pledged for farmers' repayments. But 30% of the repayments were unable to be collected. A few years have passed since the procedures were delayed, and interest on late payment penalty charge has accumulated during this period. As a result, the state government complained to PFI that the interest on late payments was too high. Even if loan interest rates are kept low through intervention, interest on late payment penalty is usually set at a high level, but the state government may not be fully understanding of this point. It should also be noted that in the case of government agencies, compared to private companies, it takes more time to formally accommodate unexpected costs.

The TSL scheme considered in this study needs to refer to the ABP and CACS mechanisms and take into account the lessons learned from them.

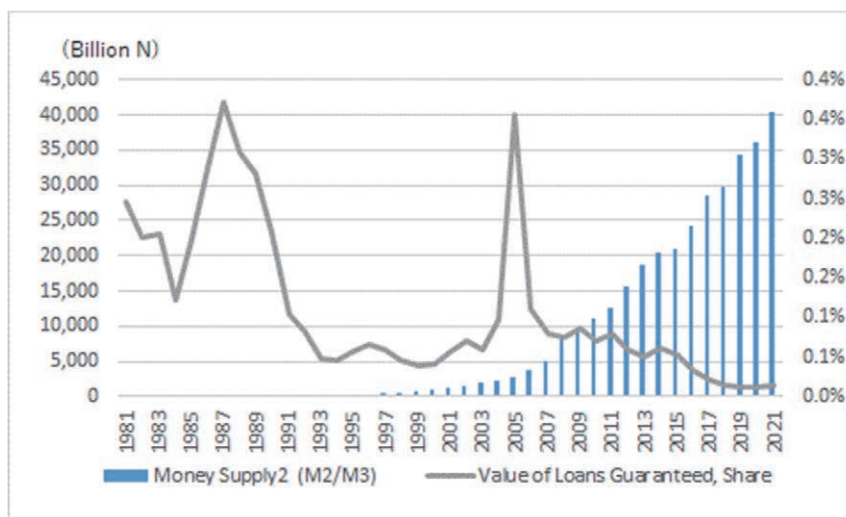
c) Agricultural Credit Guarantee Scheme Fund (ACGSF)

• Organization of ACGSF

The Agricultural Credit Guarantee Scheme is operated by the Agricultural Credit Guarantee Scheme Fund (ACGSF) which was established in 1978. The initial capital of the fund was N100 million, with 60% owned by the Federal Government and 40% by CBN. The capital was expanded to N3 billion in 2001. CBN operates the fund and the credit guarantee system actually.

• Overview of ACGSF

The Agricultural Loan Credit Guarantee System is a mechanism to compensate losses with up to 75% of the loss amount after disposal of collateral for loans to farmers. The CBN is responsible for the operations of the fund, while currently the operations are mainly carried out by the Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL), which will be described later.



Note: Money Supply2 is an indicator of broad liquidity in Nigeria. The amount of value of loans guaranteed once spiked in 2005, but this may be a statistical error. The CBN Statistics Bulletin lists the actual amount in 2005 as N 9,366,392.9 million, while the 2005 annual report of ACGFS lists the actual amount in 2005 as N 3,047 million.

Source: Made by the survey team based on CBN, Statistics Bulletin

Figure 2-46 Historical use of ACGS: ratio of guaranteed loans to the money supply

Looking at the use of ACGS in terms of the ratio of insured loans to the money supply, it has declined sharply in the 1990s. According to CBN's website, the liberalization of lending by abolishing quantitative control by CBN has made banks more risk-averse in the agricultural sector. The banks reduced priority especially for loans to small-scale producers who do not have collateral assets and have high loan administration costs. As a countermeasure, the CBN has introduced a system to deal with collateral shortages and high interest rates that can occur even under the ACGSF. CBN has introduced intervention schemes which are available with ACGS.

Table 2-46 Schemes to supplement ACGSF

Scheme	Overview
The Self-Help Group Linkage Programme	- Under the programme, farmers are encouraged to form themselves into groups of between 5 and 15 on the basis of common purpose. - The groups are encouraged to undertake regular savings with a partner bank of their choice. After operating such savings for six months, they could then apply to the partner bank for loan. The amount saved provides part of cash security for loans to saving groups.
The Trust Fund Model	State/Local Governments, Non-Governmental Organizations (NGOs) and Oil companies (as social contribution), place funds in trust with lending banks to augment the small group-savings of the farmers as security for

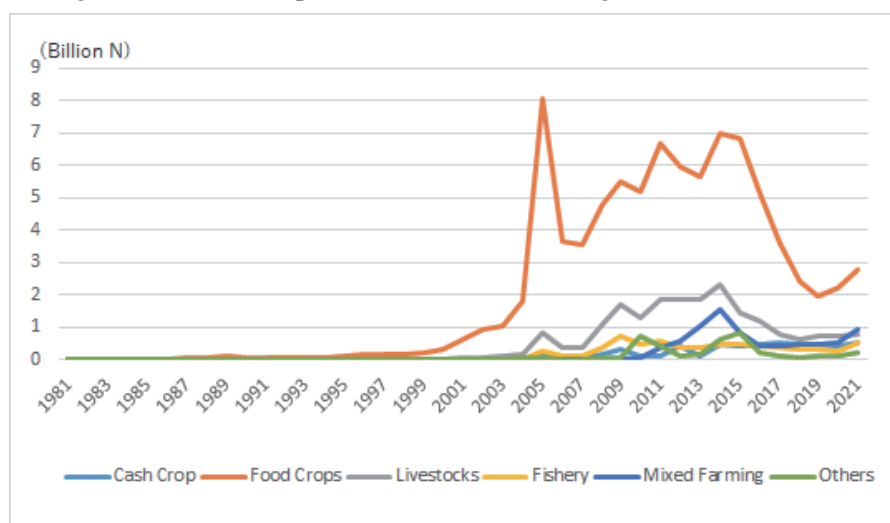
Scheme	Overview
	agricultural loans. The Trust Fund secures 25% or more of the intended loans of the prospective borrowers, the farmers' savings secure another 25% (saving deposit kept as collateral until the repayment of the loan) while the ACGSF guarantees 75% of the remaining 50%, thereby leaving the lending bank with a risk exposure of only 12.5%.
The Interest Drawback Programme (IDP)	- Farmers will borrow from lending banks at market-determined rates but the Programme will provide interest rebate of a determined percentage to them where the loans are repaid when due. - IDP has impacted positively on the operations of the Scheme as it induced clients to repay on time. - The IDP has an authorized capital fund of about N2.0 billion, funded jointly by the Federal Government of Nigeria and the CBN in the ratio of 60:40.

Source: CBN Website

Usage of ACGS

As shown in the figure below, the usage of ACGSF increased through 2015, indicating that the supplementing schemes mentioned above were effective. However, it has decreased noticeably since 2015. The reason behind this is that, as shown in the table below, most of the users of ACGSF are individual farmers, so it is possible that some loans for individual farmers have shifted from loans using ACGSF to ABP.

Looking at changes in the use ACGS by target commodities (see the chart below), Food Crops is consistently the largest, and Cash Crop and Livestock are not significant in terms of amount.



Source: Made by the survey team based on CBN, Statistics Bulletin

Figure 2-47 Historical use of ACGS: insured loans by target commodities

Looking at the attributes of the borrowers, individual farmers are dominant in terms of both the number of loans and the amount.

Table 2-47 Use of ACGS by types of borrowers (in accumulation)

	Individual	Informal Group	Cooperative	Company	Total
Number	1,184,872	15,597	17,561	2,140	1,220,170
Amount (Billion Nira)	121.3	2.0	3.4	1.6	128.3

Source: Made by the survey team based on CBN, Statistics Bulletin

In recent years, ACGSF has been used in conjunction with the Self-Help Group Linkage program and the Interest Drawback Program (IDP), which benefit borrowers with single-digit interest rates and no physical collateral. ACGFS as a whole has a cumulative usage of N128 billion and 915,000 cases from 2001 to 2021 (N 140,000 per case). Also, it is mainly used by MFBs when lending to individual farmers. In such cases, since small-scale farmers do not have assets to serve as collateral, a scheme is used in which farmers in the group jointly guarantee each other.

ii) Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL)

NIRSAL is a CBN wholly owned company and a self-sufficient organization. It has offices in 36 states, each with more than 14 staffs. It provides credit guarantees (risk sharing), technical support for agricultural insurance, and support for building value chains.

The cumulative total principal amount of loans guaranteed to date is N400 billion. When NIRSAL performs subrogation repayment based on the credit guarantee contract, NIRSAL will perform the activities for exercising the right of indemnification (recourse the paid funds) by themselves. This means NIRSAL does not impose a burden on the bank to perform collection on behalf of NIRSAL. In addition, NIRSAL supports insurance companies' agricultural insurance by developing products and providing data related to index agricultural insurance.

Thus, NIRSAL is an organization like a policy financial institution for agriculture, and its function is to promote agricultural investment and financing by the private sector through consulting on agricultural insurance and agricultural VCs, in addition to credit guarantees. When considering TSL scheme, it is helpful to make a package to combine support by these functions with the investment/loan to be financed.

An overview of the agricultural credit guarantees and related services provided by NIRSAL is shown in the table below.

Table 2-48 Outline of agricultural credit guarantee provided by NIRSAL

Items	Outline
Ceiling of coverage of guarantee	75% of the targeted loan amount (going to be updated to 80% as for small scale farmers)
Eligible loan amount (WC)	Cost of Production (CoP). CoP of 5 ha is the maximum amount for individual farmers The loan amount is subject to the cultivation area for organization such as cooperatives
Eligible loan amount (Fixed asset investment)	Non-mechanization equipment (Thresher etc.): 50% of purchased value Mechanization equipment (Tractor, etc.): 75% of purchased value Tenor depends on the banks.
Guarantee fee	Charge 1% of the remaining balance the covered amount until the full repayment.
Other fees	If setting up Monitoring & Evaluation (M&E) as an optional service,

	NIRSAL personnel will monitor farmers and provide risk advice. The basic cost (General Monitoring) is 1% of the guaranteed balance. Customized services depending on the content of the project will be determined through separate discussions.

Source: Interview with NRSAL

iii) Nigerian Agricultural Insurance Corporation (NAIC)

• Organization of NAIC

Since general private insurance companies did not cover agricultural insurance, the Nigerian Agricultural Insurance Company Limited was established in 1988 to provide insurance to farmers and was later reorganized into the Nigerian Agricultural Insurance Corporation (NAIC). The NAIC is a 100% federally owned public corporation under the NAIC Act (1993).

The organizational structure of NAIC is shown in the table below.

Table 2-49 Organization of NAIC

Department	Roles
UNDERWRITING	The department is in charge of the corporation 's Agric and General Insurance
CLAIMS/REINSURANCE	The department is in charge of the Corporation's Claims administration. They are also responsible for arranging the reinsurance business.
Finance	The department is responsible for all the financial transaction of the Corporation.
ADMINISTRATION/HUMAN RESOURCE DEPARTMENT	This department is responsible for general administration and human resource development in the Corporation.
BUSINESS DEVELOPMENT	This department is responsible for the development and marketing of various products offered by the Corporation.
INTERNAL AUDIT	This department is responsible for the internal audit and compliance processes of the Corporation.
LEGAL UNIT	This unit is responsible for all the legal issues in the Corporation.
STRATEGY & CORPORATE PLANNING	This department comprise the following units: ICT, Planning and , Research & Development, Corporate Affairs (Public Relation).

Source: NAIC Website

NAIC has offices in each state with 5 staffs on average, and has so far covered N 1 trillion in insurance value through receiving several billion Naira in premium.

• Agricultural insurance scheme

The agricultural insurance premium rates provided by NAIC are as follows.

Premium = Cost of variable inputs (Estimated cost of Production) X premium rate

- a. Premium rate (subsidized) = 4% (for food crops; Farmers pay 2%)
5% (for livestock: cattle, goat, fisheries, poultry; Farmers pay 2.5%)
- b. Premium rate (Commercial crops and livestock)
Commercial crop – ranges from 1.5% - 5%
Commercial livestock – ranges from 5% - 10%

The scope of costs subject to insurance premium rates is as follows.

- i) The Estimated cost of production is based on the current prices of the variable inputs used in the production process according to the agro-ecological zones or the loan amount or volume.
- ii) Cost of inputs usually cover the following:
 - a. Land preparation;
 - b. Weeding/herbicides, fertilizer application;
 - c. Seedlings, Irrigation (where necessary);
 - d. Harvesting, Insurance, Miscellaneous
- iii) The estimated cost of production also depends on the type of project, location, cost of inputs at any/given period of time.

NAIC provides the following subsidies for agricultural insurance.

Table 2-50 Subsidized insurance by NAIC

Target	Eligible perils and subsidy
Livestock	• Subsidized 50% of premium farmers' pay for Livestock policy. • Perils under cover are; death of animals/birds/fishes due to disease, accident, fire, lightning, storm and flood.
Crops	• Subsidized 50% of premium farmers' pay for crop Policy. • Perils under cover are loss or damage resulting from Fire, Lightning, explosion, aircraft damage, windstorm, flood and drought.

Source : NAIC Website (<https://www.naic.gov.ng/function-of-naic>)

NIAC obtains farmland data from the National Space Research and Development Agency, and also obtains data from NIMET (Nigerian Meteorological Agency). NAIC has farmers database like FMARD and CBN.

When considering TSL scheme, a package of agricultural insurance and sub-loans might be considered. Also collaboration for mapping farmland of farmers and promotion of registration might be considered.

iv) **Development Financial Institutions (DFI)**

Since DFI is a government-funded development financial institution, DFIs might perform a role as an implementing agency that provides funds to PFI, and a role of PFI that directly provides loans to agricultural producers and agricultural VC companies under the TSL considered in this study.

As mentioned above, among the DFIs, BOA, BOI, and DBN are involved in agriculture-related loans. The summary of those DFIs are in the table below. Regarding the sectors targeted for support, BOA targets agricultural producers including farmers. BOI targets companies including large companies. In agriculture-related sectors, BOI supports companies involved in VC such as suppliers, distribution, processing, and export, as well as start-up companies, so it will also contribute to farmers' access to

finance and markets through these companies. BOI also covers investment funds for agricultural machinery, livestock, and fisheries. On the other hand, DBN aims to support MSMEs which may include small and medium-sized processing enterprises in rural areas.

The functions are organized into the function of direct lending to customers (retail) and the function of wholesale (providing indirect support by lending to PFI). BOA is for retail only, and BOI performs both retail and wholesale functions. BN only performs wholesale function. Although BOI has the largest loan balance among the DFIs, as compared to commercial banks, it ranks 11th from the top, and DBN ranks 13th. BOA is in excess of debt as of 2020, making it difficult to expand its operations at present. Therefore, government policies such as NATIP plans to inject capital and reform its organization and operations of BOA

As a point of view when considering TSL, sources of concessional funds for development finance are also listed in the table. BOA receives funding from the CBN, and BOI receives funding from the CBN and foreign development finance institutions. DBN receives investment from overseas development financial institutions, and most of its funding comes from overseas development financial institutions.

Table 2-51 DFIs related to agricultural finance

(Unit: N millions)

Item	Bank of Agriculture (BOA) (2020)	Bank of Industry (BOI) (2021)	Development Bank of Nigeria (DBN) (2021)
Target sectors	Agricultural producers	Enterprises	MSMEs
Functions	Direct lending to agricultural producers. Wholesale (TSL) is not implemented.	Provide both direct lending to businesses and wholesale (TSL).	Mainly conducts wholesale (TSL). Direct lending is not available.
Equity owners	FMOF, CBN	FMOF, CBN	FMOF, CBN, AfDB, EIB
Supervisor	CBN, FMAFS	CBN, Federal Ministry of Industry, Trade & Investment	CBN
Total assets	35,762	1,712,021	501,502
Gross earnings	4,787	184,555	38,554
Profit after tax	-3,728	53,417	16,422
Capital	-77,290	384,846	194,376
Loans and Advances to Customers	11,288	780,477	321,695
Loan loss ratio	60.9%	1.2%	0.0%
Deposit from customers	8,603	None	None
Other borrowed funds for development finance	90,202 • CBN: 90,202 (Micro Small Medium Enterprise Development Fund (MSMEDF)) .Borrow by 2% interest rate and lend by 7% to target borrowers	1,125,304 • CBN: 185,408 (CBN finances zero-coupon bond. For power and aviation, restructuring SMEs) • CBN: 201,989 (Restructure industry, 2 %) • AfDB: 15,323 (Non-oi; export oriented	298,135 • AfDB: 61,015 (4%) • AFD: 38,020 (3.55%) • IBRD: 139,347 (4%) • KfW: 46,510 (3.99%) • African Development Fund (Special fund of AfDB): 13,242 (1%)

Item	Bank of Agriculture (BOA) (2020)	Bank of Industry (BOI) (2021)	Development Bank of Nigeria (DBN) (2021)
		industry/SMEs, 6 months libor+6bsp)	
Employees	623 (2023)	616 (2021)	55 (2022)

Note: DBN is co-founded by international development partners. As a wholesale bank, DBN aims to promote financing for small and medium-sized enterprises by providing funds (on-lending funds) and risk sharing to banks. Direct lending to small and medium-sized enterprises, including those related to agriculture, are out of its purpose.

Note: Wholesale is a business in which financial institutions provide loans to other financial institutions (in a broad sense, it may include not only loans but also the handling of deposits and investment products).

Loan loss ratio=Impairment charges/ Loans and Advances to Customers

NPL ratio is not available for DFIs disclosure.

Source: From each DFI's annual report

If summarizing the above from the perspective of actors involved in the TSL under consideration, the CBN is the only organization that functions as a TSL implementation organization for the agricultural sector. On the other hand, among DFIs, the ones that could function as a PFI for the agricultural sector are BOA (mainly for agricultural producers) and BOI (mainly for agricultural VC companies). Below, we will summarize the status of BOA and BOI.

a) **Bank of Agriculture (BOA)**

The Bank of Agriculture (BOA) was established in 2001 as the Nigeria Agricultural, Cooperative and Rural Development Bank, 60% owned by the Federal Ministry of Finance and 40% owned by CBN. It was changed to its current name, BOA, in 2007. The share capital is currently N 115 billion. BOA has 110 branches in Nigeria, at least 3 branches per one State. CBN supervises BOA as a bank, and FMAFS supervises BOA in terms of agricultural policy implementation.

70% of its customers are farmers (farmers and agricultural production and processing corporations). BOA lends to agricultural producers, including cooperatives, as well as livestock and fisheries producers. On the other hand, the Bank of Industry (BOI), which will be described later, is in charge of serving financing for processors, and loans to the Agricultural Machinery Owners Association among agricultural mechanization investments because it is actually a leasing business.

The BOA's loans are classified into small loans and large loans according to the size of the loan limit, as shown in the table. In practice, the primary purpose of borrowing is for working capital.

Table 2-52 Loan products of BOA

Criteria	Loan amount	Interest rate	Repayment period
Small	N 50- 250 thousand	12% (Production) 20% (Processing)	Short-term such as 1 year
Large (Individual)	N 1-5million	14% (Production) 20% (Processing)	1-3 years
Large (Corporation)	N 5million – 1billion	Sam as above	Same as above
	N 1- 10billion	Negotiable	Negotiable

Source: Existing JICA Report

BOA applies a mode of lending similar to MFBs when it comes to lending to informal farmers groups and agricultural cooperatives with weak organizational foundations. For example, farmers are divided into groups of about 10 households each, the members will mutually guarantee each other, and the leader of each group will be responsible for repayment. Only after the first group has completed repayment, another loan is extended to the next group.

The BOA is also active and experienced in lending to cooperatives, and has a list of good cooperatives in 36 states, which are sustainable organizations and actually farming. BOA supports pilot projects for poultry cooperatives in Gombe, Bauchi and Kano States.

In terms of source of financing, BOA accepts deposits from customers and also raises concessional funds from the CBN. As of the interview in December 2023, the BOA had received N66 billion from CBN, which is being used to finance small-scale farmers and small and medium-sized enterprises producing rice and maize.

b) Bank of Industry (BOI)

BOI is 50.44% invested by FMOF, 49.56% by CBN. As of the end of 2022, the capital account is N427 billion and the share capital is N143 billion. The CBN supervises BOI as a bank, and the Federal Ministry of Industry, Trade & Investment (FMITI) supervises BOI over the industrial policy. BOI has branches in each of the states.

• Loan target

The BOI provides loans to companies and processing cooperatives in the processing sector within the agricultural sector. So far, BOI has financed 20 rice milling machine investments, as well as loans for tomato processing and orange processing. Regarding investment in agricultural machinery, BOI provides an investment funds for agricultural machinery investors through mechanization service providers, which are major owners associations such as the Tractors Owners & Hiring Facilities Association of Nigeria (Tohfan).

BOI provides loans to companies and processing cooperatives in the processing sector of the agricultural sector. So far, BOI provided financing for 20 investments in rice milling machines, as well as loans for tomato processing and orange processing. Regarding investments in agricultural machinery, BOI provides funds through service providers, namely major owners associations such as Tractors Owners & Hiring Facilities Association of Nigeria (Tohfan), for investments in agricultural machinery to their affiliated companies (investors).

Since loans are not provided for the production sector, farmers are generally not eligible for loans. However, in the case of co-financing from public institutions, loans can be made to producer associations. The Aggregator Lending Scheme also provides fertilizer, seeds and extension services to thousands of farmers, for example through loans to Babban Gona.

- **Financing terms**

The maximum loan term is 10 years. Interest rates range from single digits to 10%, with 9% for MSMEs. As for collateral, loans under N 10 million can be available with only guarantee by a third party, and above that amount level, physical collateral is required. Accounts receivable collateral is possible. Although it is not registered, but BOI recognizes that the requirements for perfection are sufficient through a three-party contract between the BOI, the borrower company, and the accounts receivable obligor. Regarding collateral valuation, BOI asks members of the Nigerian Institution of Estate Surveyors and Valuers to appraise value of the collateral because it sets certain eligibility criteria. Assuming a forced sale from the assessed market value, it is possible to provide credit of up to 100 against the market value of 150.

- **Fundraising**

The BOI raises funds by issuing foreign currency bonds in overseas markets. For this purpose, BOI is rated by Fitch and Moody's. It also receives direct funding from international donors.

BOI wishes JICA support the fisheries industry in Rivers and Delta states which have financial needs for fishing boats, storage, and freezing and smoking processing plants. This is because fishery sector faces bottle necks of finance regardless of the high potential of growth and profit.

- v) **Commercial Banks**

There are currently 24 commercial banks, and their licenses are classified into three categories according to their capital and operating areas (Regional: operating in some states, National: operating in all the states, International: overseas operations are also possible). In terms of asset size, it is concentrated in International, with the top five banks accounting for about 70% of the total assets. On the other hand, the amount of agricultural loans and the percentage of it to total loans vary widely among banks.

Table 2-53 List of Commercial Banks

	License	Total assets	Loans and Advances to Customers	Deposit from customers	Loan to Agricultural sector	Ratio of loans to agricultural sector	Capital adequacy ratio (CAR)	liquidity ratio	loan to deposit ratio
Access Bank Plc	International	11,731,964	4,161,363	6,954,827	43,252	1.00%	24.5%	51.0%	59.8%
Zenith Bank Plc	International	9,447,843	3,501,878	6,472,054	227,237	6.49%	21.0%	71.6%	54.1%
Fidelity Bank Plc	International	3,289,479	1,658,412	2,024,806	71,759	4.14%	20.1%	40.4%	81.9%
FIRST BANK NIGERIA LIMITED	International	8,932,373	2,881,916	5,849,487	391	0.2%	17.4%	above 30%	49.3%
First City Monument Bank Plc	International	2,493,198	1,063,589	1,554,414	78,907	7.1%	16.2%	34.4%	68.4%
Guaranty Trust Bank Plc	International	5,436,035	1,802,587	4,012,306	116,577	7.4%	25.4%	38.3%	44.9%
Union Bank of Nigeria Plc	International	2,595,769	868,840	1,355,910	30,557	3.5%	14.6%	35.0%	64.1%
United Bank For Africa Plc	International	8,541,318	2,680,667	6,369,189	81,719	3.3%	24.9%	65.3%	40.4%
Citibank Nigeria Limited	National								
Ecobank Nigeria Plc	National	2,475,079	1,015,603	1,675,636	131,824	14.3%	11.5%		60.6%
Heritage Banking Company Ltd.	National								
Keystone Bank Limited	National								
Polaris Bank Plc	National	1,094,252	204,784	914,323					22.4%
STANBIC IBTC BANK PLC	National	2,742,764	946,259	1,126,535	31,157	3.2%	16.1%	105.4%	84.0%
Standard Chartered Bank Nigeria Ltd.	National								
Sterling Bank Plc	National	1,629,129	711,900	1,208,753	76,727	10.6%	14.8%	37.9%	58.9%
Titan Trust Bank Ltd	National	246,236	63,066	182,383	128	0.2%	34.7%	67.3%	34.6%
Unity Bank Plc	National	538,868	269,269	322,284	246,609	90.5%	-86.2%	31.0%	83.6%
Wema Bank Plc	National	1,175,490	418,864	927,471	20,659	4.7%	11.7%	29.8%	45.2%
Globus Bank Limited	Regional	260,136	105,385	161,961					65.1%
Parallex Bank Ltd	Regional								
Premium Trust Bank	Regional								
Providus Bank	Regional	439,804	102,876	207,894	8,230	8.0%	15.8%	74.9%	49.5%
SunTrust Bank Nigeria Limited	Regional	67,954	15,485	50,843					
Total		63,137,691	22,472,743	41,371,076	1,165,733	6.1%			

Source: Annual Reports of the banks

- Agricultural loan scheme

Commercial banks do not offer any special products for agricultural loans. Reflecting market interest rates in June 2023, 10% and lower range of 10% for blue-chip companies and around 20% to lower range of 20% for others would be applied. However, by utilizing the preferential programs of CBN and development financial institutions (DFIs), farmers and agriculture related companies may access low-interest (single-digit) loans. Besides, some commercial banks serve single-digit loan products to women and young people. In addition, some banks offer several percent lower interest rates in consideration of the special shaping of agricultural cash flow, and may apply low interest to loans for export because those credit for export is highly reliable.

Some banks are of the opinion that loans to farmers and small-scale producers will not be profitable for those producers unless the annual interest rate is 15% or less.

- Collateral practice

Effective collaterals include real estate such as farmland, movable properties such as inventory, equipment, and accounts receivable which are physical collaterals, and personal guarantees by third parties other than managers, and credit guarantees from CBN and NIRSAL. Financial institutions ask appraisers and experts to calculate the market value and forced sale values of physical assets (for

example, forced sales value is about 25% less than the market value), and then discount 30% to 50% depending on the type of asset (hair cut) to result with the collateral appraisal value. In many cases, this appraisal value is equivalent to 100% to 150% of the loan amount.

The table below summarizes loan balances by size of borrowers (especially focus on farmers), normal interest rates and fees in the absence of support such as on-lending programs, and examples of assets eligible for collateral by bank (anonymous).

Table 2-54 Examples of terms and conditions of commercial banks

Banks	Loan balance by borrower size (2022) / Interest & fee rate/ Eligible asset for collateral
Bank A	Medium scale farmers (not less than 5ha): N114.4 billion / 15-22% + other fees (1-2%) / assets except crops are eligible for collateral
Bank B	Small scale farmers (2-5ha): N12.7 billion / 22-33% + other fee (1-3%) / Guarantee is eligible Medium scale farmers (Not less than 2.5ha): N212 billion / 21-33% + management fee / personal assets, construction/building are eligible
Bank C	Small scale farmers (1-2ha for crop, less than 200 poultry birds, 5 cattle, 10 goats, etc.): NA / 10-26% + commitment fee, monitoring fee / Guarantee, machinery, durable crops, construction/building are eligible Medium scale farmers (not less than 3ha): 18-24% + commitment fee, monitoring fee / Guarantee, machinery, durable crops, construction/building, Legal mortgage over a developed property within approved locations, All Asset Debiture are eligible Small sized enterprises: N 31 billion / 22-28% + commitment fee, monitoring fee / Same above Medium sized enterprises: N31 billion / 22-28% + commitment fee, monitoring fee / Same above Large sized enterprises: N 114 billion / 16-24% + commitment fee, monitoring fee / Same above

Note: Types of assets eligible for collateral are specified from choices such as cross guarantee, guaranty, third party guarantee, personal asset, machinery, durable commodity in warehouse, construction/building, farm land), and Others

Note: Although there are multiple definitions of SMEs in Nigeria, the definition used by each bank is not made public. For example, CBN's credit guarantee scheme for SMEs has total assets (excluding land) of N5 million to N500 million and the number of employees ranges from 11 to 300. Small and Medium Enterprises Development Agency of Nigeria (SMEDAN) also states that in terms of employee size, micro enterprises have less than 10 employees, small enterprises have 10 to 49 employees, medium enterprises have 50 to 199 employees. In terms asset size, total assets excluding land and buildings is applied; Micro enterprises are defined as less than N5 million, small enterprises are defined as N5 million or more but less than N50 million, medium enterprises are defined as N50 million or more but less than N500 million. If a falls in a different company classification results, classification of employees remain.

Source: Questionnaire survey to commercial banks

• Access to farmers

Larger commercial banks with international licenses or national licenses have branches in all states, but it is difficult to directly access farmers in rural areas. On the other hand, in Nigeria, as shown in the table below, a large number of agents are deployed in rural areas, and they provide services such as remittances in rural markets and shopping streets.

Table 2-55 Example of number branches, employees and agents of commercial banks

Bank	Loan balance	Number of branches	Number of employees	Number of agents
Bank D	N 5,261 billion	731	7,000	160,740
Bank E	N 1,381 billion	281	2,025	51,737
Bank F	N 1,196 billion	205	3,342	37,651

Source: Questionnaire survey to commercial banks

Agents are regulated by the CBN and have contracts with multiple banks to perform operations such as account opening, deposits and withdrawals, and remittances remotely using POS terminals and earn fees. For this reason, agents play an important role as points of contact with farmers, and as a result, they play a role in disseminating financial knowledge to farmers. In addition, agents may also be tasked with acting as agents and managers for agricultural startups in rural areas. The CBN supports agents from the perspective of financial inclusion, and in addition to making them regulated, it also provides on-lending program financing for agents to provide low-interest loans.

In addition, some banks assign seasonal rural managers on a loan project basis to monitor the farmers targeted for loans and facilitate repayment. Even in the aforementioned ABP, while there have been some cases where it has been difficult to collect repayment from farmers, banks with rural managers have been able to maintain low delinquency rates even in direct loans to farmers.

vi) **Microfinance Banks (MFB)**

According to CBN's website, there are 893 Microfinance Banks (MFBs) registered (as of April 20, 2023).

A MFB cannot operate unless it applies to the CBN and is granted an MFB license. Licenses are divided into three types based on the amount of capital and geographical scope of operation. For commercial banks, the minimum capital amount is N10 billion, whereas MFBs can operate on a smaller scale, as shown in the table below.

Table 2-56 License of Microfinance Banks

License	Area of operation	Minimum capital
Unit MFB	Operate at one unit. Can operate Cash Offices in not more than 5 LGAs (within the same State)	N 20 million
State MFB	Single State or FCT	N 100 million
National MFB	Multiple States including FCT	N 2 billion

Source: CBN Website

There are 9 MFBs with the National licenses according to National Association of Microfinance Banks (NAMB) as of July 2023, among which NPF MFB has been approved to become Commercial Bank.

1. NPF MFB (Will be converted to Commercial Bank)
2. NIRSAL MFB

3. LAPO MFB
4. BAOBAB MFB
5. AB MFB
6. ACCION MFB
7. ASHA MFB
8. LETSHEGO MFB
9. LA FAYETTE MFB

Compared to commercial banks, MFIs do not differ in the types of operations that they can perform, but there are certain restrictions, particularly with respect to lending.

Table 2-57 Restrictions imposed on MFBs in lending

Restrictions	Outline
Single borrower limit	1% of MFB's shareholders' equity for individuals and 5% for corporations and organizations. (Compared with up to 20% for commercial banks)
Ratio of micro lending	Maintain micro lending balances at 80% or more of total loan balances. Definition of Micro Loans: - For Unit MFB: N 500 thousand or less - For State and National MFB: N 1 million or less
Ratio of credit to MSMEs	Maintain MSME loan balance at 20% or more of total loan balance.
Tenor of loans	- As a general rule, within 24 months. In the case of government programs such as ABP, it follows the respective conditions (5 years in case of ABP). - However, NIRSAL MFB is usually available for up to 5 years.

Source: Based on interviews with National Association of Microfinance Banks (NAMB)

In this way, MFBs are positioned as financial institutions that focus on small-scale loans in agricultural sector. Cross guarantees among farmer groups seem to be common. It seems a burden for farmers to register their farmland title at the expense of cost and time to receive small and short-term loans.

The Nasarawa Microfinance Bank, which was interviewed during the first field survey, is an example of MFB's lending operations in rural areas. The MFB has three branches, N600 million in deposits, N430 million in loans, and 56 employees. The interest rate on savings deposits is 3% per month, and the interest rate on loans is 25% to 28% per month for traders and 5% for six months (0.8% per month or less) for farmers. The loan limit per person is set at N 500,000 for farmers and N20 million for traders.

It is said that loans to farmers are extended in cross-guaranteed by the group. This scheme seems to be supported by CBN's ACGS, the self-help group linkage program, and the interest drawback program (IDP). Farmers have a great need for loans, and about 100 farmers are waiting on a waiting list according to the interviews.

Table 2-58 Examples of terms and conditions of MFBs

MFBs	Loan balance by borrower size (2022) / Interest & fee rate/ Eligible asset for collateral
MFB A (State MFB)	Small scale farmers (less than 2ha): N 60 million / 2.5-3% monthly + management fee (0.5-2%) / All the types are eligible Medium scale farmers (2-4ha): N 100 million / 2.5-3% monthly + management fee (0.5-2%) / Same above Agricultural cooperatives: N 110 million / 2.5-3% monthly + management fee (0.5-2%) / Same above

MFBs	Loan balance by borrower size (2022) / Interest & fee rate/ Eligible asset for collateral
	Credit cooperatives: N 300 million / 2.5-3% monthly + management fee (0.5-2%) / Same above Micro enterprises: N 1,283 million / 2.5-4% monthly + management fee (0.5-2%) / Same above Small sized enterprises: N 3,458 million / 2.5-4% monthly + management fee (0.5-2%) / Same above Medium sized enterprises: N 1,130 million / 2.5-4% monthly + management fee (0.5-2%) / Same above Large sized enterprises: N 2,041 million / 2.5-4% monthly + management fee (0.5-2%) / Same above
MFB B (Unit MFB)	Small scale farmers (less than 2ha): N 162 million / 5% monthly + processing fee / Guarantee, Personal assets, Machinery, Durable crops Medium scale farmers (2-4ha): loan balance and terms & conditions are not available
MFB C (State MFB)	Small scale farmers (1-10 plots): N 189 million / 3% monthly + 2% processing fees payable upfront / Guarantee, personal assets, machinery, farm land are eligible Agricultural cooperatives: N 20 million/ 2% monthly + 2% processing fees / Guarantee is eligible Micro enterprises: N 1.5 billion / 5% (3% for agricultural sector) monthly + 2% processing fees payable upfront / Guarantee, personal assets, machinery, farm land are eligible Small sized enterprises: NA / 4% monthly, No fee / Guarantee, personal assets, machinery, construction and building are eligible Medium sized enterprises : Not less than N 5 billion / 4% monthly + 2% upfront fees payable upfront / Same above
MFB D (Unit MFB)	Small scale farmers (1-2ha) : N 144million / 20% per annum + Management fee 3% / Same above

Note: Types of assets eligible for collateral are specified from choices such as cross guarantee, guaranty, third party guarantee, personal asset, machinery, durable commodity in warehouse, construction/building, farm land), and Others

Note: Although there are multiple definitions of SMEs in Nigeria, the definition used by each bank is not made public.

Source: Questionnaire survey to MFBs

vii) Credit Cooperatives

Credit cooperatives, like other cooperatives, have a four-layer structure: federal APEX, state APEX, unions, and unit cooperatives which are societies. There are 2,040 credit cooperatives across 36 states with more than 5.2 million members.

National Cooperative Financing Agency of Nigeria (CFAN). CFAN is a federal level APEX organization of credit cooperatives under the Nigerian Cooperative Act 2004 with 23 staff members and 6 departments:

1. Administration & Membership
2. Training & Program
3. Finance & Accounts
4. Risk/Credit Management
5. IT & MIS
6. Monitoring & Evaluation

CFAN oversees and inspects APEX at the federal level. The Risk/Credit Management Department develops checklists that State APEX uses to monitor unions. The checklist consists of contents for maintaining the soundness of credit activities regarding loans to members, cross-guarantees between members, fund raising, etc.

Credit cooperatives lend out funds raised from members' contribution and saving deposits. After being enrolled as a member for 6 months or more, the members (micro enterprises and farmers) can borrow up to their own contribution amount without collateral. If they exceed this amount, they can borrow with other members' guarantees. Loan interest rates are in single digits. .

In addition, credit cooperatives can borrow from banks with physical collateral and use the funds to provide loans to their members. However, in that case, the interest rate on the loan for members is likely to be set higher depending on the cost of raising funds from the bank. There is another fund flow in which State APEX borrows from CBN and lends to the union and unit cooperatives.

25% of the profits of the credit cooperatives are capitalized as surplus, 2.5% go to funds for education and training and other charities, and a certain percentage (according to the articles of by-laws) is paid to members as dividends.

CFAN intends to establish Cooperative Development Fund, and would like to use it to receive funds from international donors.

(5) Challenges and direction of improvement

1) Bank loan conditions (gap with the needs of the borrower)

In the absence of government support, regular (commercial) interest rates for farmers range from 24% to 60% annually. On the other hand, there is an opinion that loans for agricultural producers should be 15% or less due to uncertainties such as profitability and the natural environment. Furthermore, looking at the example of farmers described in Chapter 3, interest rates are too high without government intervention, making it difficult to secure return on investment in the field of agricultural production. For this reason, the government is supporting agricultural producers through the CBN's on-lending schemes, but the agricultural finance ratio is 6%, which is still lower than the NDP's goal of 10%. Further support for agricultural finance is needed to support investment by the private sector, including farmers, to address challenges in the agricultural sector.

Table 2-59 Proper loans to small scale farmers

Lender	Outline of conditions of loans for small scale farmers
BOA	12% to 14% annual interest rate. Max N 5million.
MFB	2% to 4% monthly interest. The loan limit is 1% of the MFB share capital (N1 million if calculated based on State MFB's minimum capital). In many cases, it is through a cross guarantee between farmers.
Credit cooperative	Members can receive loans. Single digit interest rates applied. No collateral or guarantee is required up to the amount contributed by the member.

Source: Made by the Survey team based on the interviews and questionnaire

Regarding access to and monitoring of farmers, approaches that leverage Nigeria's strengths, such as the use of agents and collaboration with startups, suggest a successful pattern, and further support could lead to significant results. For example, Zawasel, Riby, and Hello Tractor use bank agents as part of their rural managers/agents. AgroMall is promoting the BoAT (Bank of Agricultural Transformation) initiative. Each bank agent is in charge of less than 250 farmers and 12 agricultural SMEs, and through weekly contact (visits, telephone calls, etc.), they provide financial services, agricultural extension services, aggregation, logistics, and sales⁷³. On the other hand, a start-up operating quasi-agricultural cooperative type business joined ABP as an anchor company, which had good results with a recovery rate of 99%. Usage of bank agents and collaboration between banks and start-ups may suggest one of the directions to be taken to improve access to finance in rural area.

2) Financial Literacy of Farmers

As seen in the ABP case, some farmers, particularly subsistence farmers, may mistake loans, especially government-backed institutional loans, for grants. Additionally, as will be discussed later, there are also issues with the literacy of commercial transactions, such as side selling being made to third parties despite contracts to ship all quantities to anchor companies. Unless these points are improved, it will be difficult to receive loans from financial institutions, and loans and credit through anchor companies.

When receiving loans and credit, bank agents and start-up rural managers should take steps to help farmers understand the minimum level of awareness, in order to improve farmers' financial and commercial transaction literacy.

3) Financial inclusion of farmers

According to an IMF survey, Nigeria outperforms neighboring countries in the number of bank accounts and is on par with neighboring countries in the number of mobile money agents, but it falls significantly behind in the number of mobile money accounts and the amount of mobile money transactions compared to neighboring countries.

Table 2-60 Comparison of financial inclusion with neighbor countries

Items	Nigeria		Kenya		Ghana	
	2021	2022	2021	2022	2021	2022
Number of depositors with commercial banks per 1,000 adults	1,444.15	1,797.09	NA	NA	697.94	830.49
Number of registered mobile money agent outlets per 1,000 km ²	680.94	1,618.60	524.07	559.80	2,549.08	3,076.48
Number of registered mobile money accounts per 1,000 adults	191.00	225.87	2,083.36	2,176.26	2,344.53	2,619.52

⁷³ Details of these companies' efforts are described in "2.5 Digital Technology Applications and Startups in Agricultural Value Chain".

Items	Nigeria		Kenya		Ghana	
	2021	2022	2021	2022	2021	2022
Value of mobile money transactions (during the reference year) (% of GDP)	8.74	16.11	38.66	57.11	180.56	174.29

Source: IMF, Financial Access Survey

Mobile money is not widely used in rural areas in Nigeria compared to neighboring countries. Since the POS Agent system is already widespread in rural areas, there is little need for farmers if it is just used for payment. According to interviews, there are cases where mobile money is used between farmers in contract farming by large companies. During the field survey, the Survey team visited the MTN office, but unable to conduct detailed interviews as they said they were not interested in rural services. In addition, Cellulant has ended Agrikole, an app for rural areas, and is currently focusing Tingga as an app for urban areas. Tingga is a service that mediates various payment methods such as mobile money, QR code, bank account transfer, USSD, debit card, etc. with sales payments of many businesses.

Nigeria witnesses larger number of bank accounts than neighbor countries thanks to developed bank agents. Besides, Bank Verification Number (BVN) contributes to the number of bank accounts. Anyone can open a Tier 1 account with a remittance limit (maximum N 10,000) and will be given a BVN. For this reason, it is estimated that 60% of farmers have Tier 1 accounts (Comments from Riby, a startup that helps farmers organize and access finance). However, it is said that only a few farmers actually use it, because farmers have forgotten about bank accounts, and payment services such as remittances and receipt of sales proceeds are available at nearby POS agents which are sufficient for farmers.

Meanwhile, some startups that help farmers organize are using apps that offer similar functionality to farmers without using mobile money. For example, by virtually partitioning the bank accounts of the association/cooperative for each member farmer, they are supporting the settlement of payments for each farmer's sales and purchase of materials.

Considering the above-mentioned characteristics of Nigeria, it is important to promote material access to finance, such as loans, by disseminating available opportunities for access to finance and the necessary information for the access to finance through bank agents and startup's rural managers.

4) Agricultural cooperatives, farmers' organization

In Nigeria, the number of farmers belonging to formal cooperatives is around 30%. It seems that farmers' organizations are not necessarily geared toward growth through diversification and capital accumulation, as they are sometimes temporary organizations with little substance, and even registered cooperatives are sometimes limited to partial farming cooperation. During the interviews, many pointed out that the major factor behind this immature farmers organizations' performance was lost mutual trust in farming villages as a result of declining emphasis on agriculture and farming villages after the era of oil development.

ABP is often pointed out as a financial problem arising from this. ABP is a scheme to support loans for organized individual farmers. While ABP works well for farmers in real cooperatives, especially for export crops, farmers' repayment rates are low in cases where, for example, rice farmers are temporarily grouped for ABP. One of the reasons for the low repayment rate is that loans cannot be disbursed until all farmers have completed their contracts, so they cannot (or do not want to) repay because they cannot obtain funds when they needed them. In addition, it is said that there is a distrust among farmers because there was a case in the past when a loan from a government program was eventually changed to a grant and did not need to be repaid.

In order to improve this situation, startups and NGOs are supporting farmers at the grassroots level with the aim of strengthening organizations towards sustainable growth. It is necessary to promote farmer organization by supporting these startups. However, startups are not charities, and the reality is that formal cooperatives are given priority in support, potentially leaving many farmers behind. The government needs to take the lead in promoting cooperatives for these farmers.

5) Formulation of value chain (VC) and contract farming

In other countries, there are cases where contract farming functions as an opportunity to encourage farmers to consolidate and strengthen their organizations. Contract farming, which provides technical assistance to farmers and support for the purchase of materials, allows farmers to cooperate with each other in production without any worries, which increases interest in reinvestment, asset building, and livelihood improvement.

A large scale farmer (operating as a farming corporation now), according to our interviews, started contract farming with neighboring small scale farmers, and concluded contracts with about 600 farmers in the first year, but many farmers did not honor the contracts and sold their crops to third parties. As a result, the number of contracted farmers had to be reduced to less than 300 in the second year. When explained about the SHEP training that JICA is implementing, he expressed the hope that if small scale and subsistence farmers are motivated through such training in advance, he would be able to conclude contract farming more efficiently.

SHEP training is carried out by each state's ADP, but due to limited budgets, it is only possible to train a few groups each year. To cope with these challenges, bank agents and start-up rural managers can be involved to conduct SHEP training to the farmers in their managed area, which shall expand potential out-growers who are motivated and enlightened to join a commercial value chain.

6) Farm land collateral

There is a mechanism for registering land titles including right of occupancy of agricultural farm land. Any registered agricultural land can be used as collateral for loans. However, as a matter of fact, the farmland of small-scale farmers is often not registered and is not used as collateral. The background of this status are mentioned to include (1) farmers do not know about registration, (2) they cannot pay registration fees, (3) farmlands are scattered in multiple locations and it is difficult to determine the

boundaries, and (4) the determination of boundaries of farmlands may trigger to be involved in a conflict. Farmers only become aware of the need for registration when they consider to receive a loan, so there is a need for strategies that encourage awareness of farmers through bank agents.

2.2.5 Agricultural Infrastructure

Since agricultural infrastructure covers a wide range of areas from upstream to downstream of VC, it is divided into five categories: 1) production infrastructure, 2) post-harvest infrastructure, 3) distribution infrastructure, 4) collection and marketing infrastructure, and 5) research, extension, and training infrastructure. All of these infrastructure facilities have been identified as lacking and need to be expanded. Particularly important challenges are the expansion of irrigation facilities to increase agricultural productivity and the improvement of rural roads, which have a significant negative impact on distribution costs and post-harvest losses. In addition, the recent VC development concept increases projects that support a flow of production, processing, and distribution.

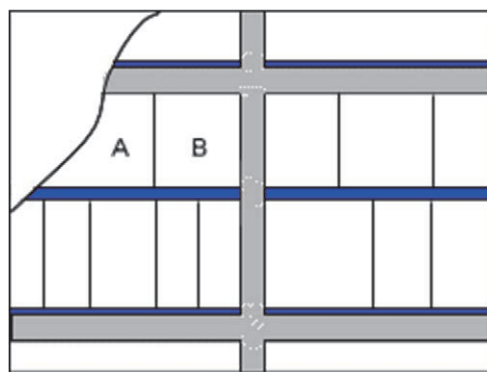
(1) Production Infrastructure

In addition to irrigation, infrastructure related to agricultural production usually includes drainage facilities, farm roads (including cultivation roads), field maintenance, and agricultural land maintenance. However, since improving the productivity of agricultural products and increasing production volume are important points here, we focused on increasing agricultural production through the development of irrigation facilities and expansion of farmland.

Furthermore, in Nigeria, the development of infrastructure related to production bases is not progressing, so farm roads, drainage canals, etc. are being developed integrally with the development of irrigation facilities. (See figure below)



Before the project: Irregular shape with no farm roads or irrigation and drainage canals



After the project: The plot will be reshaped and farm roads and irrigation and drainage canals will be constructed.

Figure 2-48 Images before and after irrigation project

Source : <https://www.city.takasaki.gunma.jp/docs/2013121900577/>

1) Agricultural Area and Irrigation Potential Area

Nigeria's land area is 924,000 km², approximately 2.5 times that of Japan, of which agricultural land accounts for a large proportion of 72%, and most of it has already been developed into arable land, permanent crop land, and grazing pasture land, and in recent years areas of arable land and permanent crops remain unchanged.

Table 2-61 Agricultural Land Area of Nigeria

Item	Area, '000 ha	Ratio, %
National Land	92,377	100.0
Agricultural Land	66,521	72.0
Cropland (excluding perm.crop)	35,000	37.9
Land under Permanent Crop	6,500	7.0
Meadows and Pastures	25,021	27.1

Source: AQUASTAT, FAOSTAT, 2020

In terms of farmland, it is not easy to expand because negative factors such as inadequate land use systems, clashes between nomads and farmers, and security incidents caused by anti-government forces have discouraged farmers from investing in farmland, while local communities oppose to large-scale development and man-power cultivation limits farmland size since farm machinery is not widely utilized. In order to overcome this situation, it is important to improve these negative factors. In addition, there are some successful examples of companies working with local communities and governments to promote agricultural development, and careful project formation fully involving local stakeholders is required.

2) Existing Public Irrigation Facility

According to “The project for review and update of Nigeria national water resources master plan”, there are 240,000 ha (301 schemes) of existing public irrigation areas in the country, of which 38,000 ha (177 schemes) have been developed, 99,000 ha (32 schemes) are under development, and 104,000 ha (92 schemes) are planned for expansion.

Table 2-62 Area of irrigation schemes of each hydrological area (HA), unit ha

Category	HA-1	HA-2	HA-3	HA-4	HA-5	HA-6	HA-7	HA-8	Total
1) Developed	24,441	3,048	905	877	630	1,449	2,250	4,418	38,018
2) Under development	9,750	5,200	11,110	1,100	11,490	24,617	1,000	34,630	98,897
3) Planned for expansion	6,850	18,698	8,250	10,517	5,580	3,332	5,160	45,550	103,937
Total	41,041	26,946	20,265	12,494	17,700	29,398	8,410	84,598	240,852

Source; Made by Survey team based on The project for review and update of Nigeria national water resources master plan, JICA, 2014

Water resource management, including irrigation facilities, is under the jurisdiction of the Federal Ministry of Water Resources (FMWR), while the Department of Irrigation and Drainage (DID) is in charge of irrigation infrastructure. The River Basin Development Authority (RBDA), under the supervision of the FMWR, operates and maintains irrigation facilities. There is a division of roles with FMWR implementing construction and rehabilitation projects and RBDA managing the facility.

In terms of water resources, the entire country is divided into eight Hydrological Areas (HAs), whereas the RBDA has 12 branches, and the two are generally located in the diagram below.

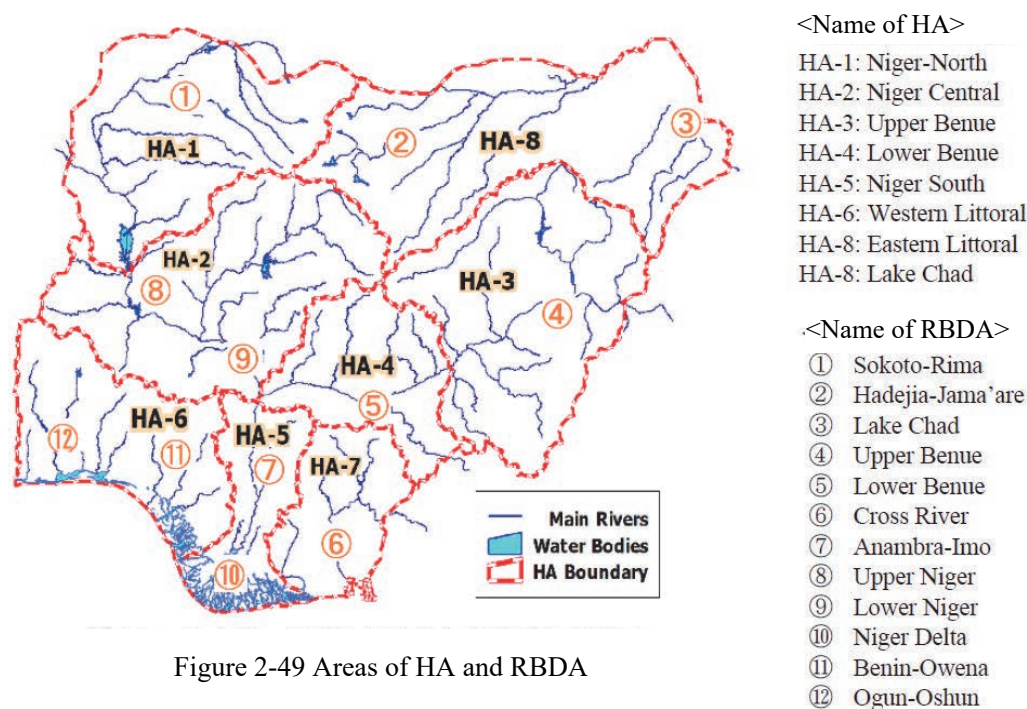


Figure 2-49 Areas of HA and RBDA

Source; JICA Data Collection Survey on Promotion of Advanced Agricultural Technologies in Sub-Saharan Africa

RBDA is responsible for watershed-level water resource development, construction and management of dams, irrigation and water supply facilities, and was established in various regions between 1973 and 1984 by Decree No 32, 33, 1973, Decree No 25, 1976, etc. The total number of staff in 12 RBDAs was over 4,400 in 2011 and exceeded the total number of staff in FMWR headquarters in Abuja. However, almost all RBDAs are dependent on the federal government for their financial resources, and pilot efforts are underway to partially privatize them in order to reform the organization.

Table 2-63 Information of RBDA

No	RBDA	Related States*1	Area (km2)*1	Headquarter *2	No. of Staff *2
①	Sokoto Rima	Katsina, Zamfara, Sokoto, Kebbi	135,100	Sokoto	520
②	Hadejia-Jama'are	Kano, Jigawa, Yobe, Borno, Bauchi,	178,500	Kano	415
③	Chad Basin	Plateau, Adamawa		Maiduguri	329
④	Upper Benue	Adamawa, Taraba, Gombe, Bauchi	156,500	Yola	305

No	RBDA	Related States*1	Area (km2)*1	Headquarter *2	No. of Staff *2
⑤	Lower Benue	Plateau, Nasarawa, Benue, Kogi	74,500	Mukardi	327
⑥	Cross River	Cross River, Anambra, Imo, Enugu, Ebonyi, Akwa Ibom, Rivers, Abia	57,400	Calabar	324
⑦	Anambra-Imo	Bayelsa, Delta, Edo, Kogi, Anambra, Rivers	53,900	Oweri	458
⑩	Niger Delta			Port Harcourt	409
⑧	Upper Niger	Niger, Kwara, Kaduna, Kogi, Federal Capital Territory	154,600	Minna	256
⑨	Lower Niger			Ilorin	471
⑪	Benin-Owena	Lagos, Ogun, Oyo, Osun, Ondo, Edo, Ekiti	99,300	Benin-City	321
⑫	Ogun-Osun			Abeokuta	307

Source; *1 Bureau of Public Enterprises, <https://www.bpe.gov.ng/river-basin-development-authorities-rbdas/>, *2 The project for review and update of Nigeria national water resources master plan, JICA, 2014

During the first round of field surveys in May-July 2023, FMWR handed out a list of 33 priority irrigation projects. The table below organizes some information of all projects. They vary from rehabilitation, new, F/S completed, and F/S needed.

Table 2-64 Priority irrigation projects list of FMWR

No	NAME OF IRRIGATION PROJECT	ZONE	STATE	AREA (HA)	COST ESTIMATE (BN)	WATER SOURCE/DAM	STUDY AND DESIGN DOCUMENT
1	DOMA	NORTH CENTRAL	BENUE	2,000	19	DOMA DAM	ON-GOING
2	KAMPE	NORTH CENTRAL	KWARA	3,000	25	OMI DAM	AVAILABLE
3	DUKU LADE	NORTH CENTRAL	KWARA	3,000	30	LADE RIVER WEIR	AVAILABLE
4	TADA SHONGA	NORTH CENTRAL	KWARA	2,700	27	DAM	AVAILABLE
5	NASARAWA	NORTH CENTRAL	NASARAWA	6,600	25	MADA RIVER	AVAILABLE, NEED REVIEW
6	FARIN-RUWA	NORTH CENTRAL	NASARAWA	3,800	35	FARIN-RUWA DAM	ON-GOING
7	AGAIE LAPAI	NORTH CENTRAL	NIGER	4,000	45	DAM	NOT AVAILABLE
8	TUNGAN KAWO DAM AND IRRIGATION	NORTH CENTRAL	NIGER	900	18	DAM	NOT AVAILABLE
9	LONGKAT	NORTH CENTRAL	PLATEAU	1,100	11	DAM	AVAILABLE
10	CHOUCHI	NORTH EAST	ADAMAWA	1,200	12	DAM	AVAILABLE
11	HAWAL	NORTH EAST	BORNO	60,000	600	DAM	NOT AVAILABLE
12	DADIN KOWA	NORTH EAST	GOMBE	2,000	20	DAM	AVAILABLE
13	DONGA SUNTAI	NORTH EAST	TARABA	6,000	39		AVAILABLE, NEED REVIEW
14	KASHIMBILA	NORTH EAST	TARABA	2,000	6	KASHIMBILA DAM	NOT AVAILABLE
15	GUYUK	NORTH EAST	BORNO	14,000	60	NEW WEIR GONGOLA RIVER	AVAILABLE
16	GALMA	NORTH WEST	KADUNA	2,500	25	GALMA DAM	NOT AVAILABLE
17	TURUNKU	NORTH WEST	KADUNA	1,000	10	DAM	AVAILABLE
18	TIGA	NORTH WEST	KANO	5,500	40	TIGA DAM	NOT AVAILABLE
19	JIBIA	NORTH WEST	KATSINA	3,500	25	GADA RIVER	AVAILABLE
20	JARE	NORTH WEST	KATSINA	5,000	30	DAM	NOT AVAILABLE
21	CONSTRUCTION OF ZOBE	NORTH WEST	KATSINA	1,200	12	DAM	AVAILABLE
22	CONSTRUCTION ZAURU POLDER	NORTH WEST	KEBBI	10,500	101	DAM	AVAILABLE
23	LOWER ANAMBRA	SOUTH EAST	ENUGU	3,000	26	RIVER ANAMBRA	TO BE PROCURED
24	ADA RICE	SOUTH EAST	ENUGU, ANAMBRA	4,000	30	OBINNA RIVER ETC.	AVAILABLE
25	IBIONO IBOM	SOUTH SOUTH	AKWA IBOM	4,000	35	IBIONO IBOM DAM	NOT AVAILABLE
26	PEREMABIRI	SOUTH SOUTH	BAYELSA	3,200	18	NUN RIVER	NOT AVAILABLE
27	ISAMPOU	SOUTH SOUTH	BAYELSA	4,500	45	ISAMPOU RIVER	NOT AVAILABLE
28	ITU	SOUTH SOUTH	CROSS RIVER	40,000	500	ITU RIVER	NOT AVAILABLE
29	LOWER OGUN	SOUTH WEST	MOKOLOKI/OGUN	3,500	33	OYAAN DAM	AVAILABLE
30	MIDDLE OGUN	SOUTH WEST	OYO	3,000	30	IKERE GORGE DAM	AVAILABLE
31	SEPETERI	SOUTH WEST	OYO	2,000	21	SEPETERI DAM	NOT AVAILABLE
32	IRAWO	SOUTH WEST	OYO	600	18	IRAWO DAM	NOT AVAILABLE
33	IKERE GORGE	SOUTH WEST	OYO	3,000	45	DAM	NOT AVAILABLE
TOTAL				212,300	2,013		

FMWR intends to develop these as priority irrigation projects, and has presented the same list to the WB as well as our survey team to encourage support.

FMWR and WB are currently implementing Transforming Irrigation Management in Nigeria (TRIMING, 2014-2022) in the northern region. Large-scale irrigation facilities in Nigeria were developed in the 1970s and 1980s, and since then the irrigated area has been reduced due to inadequate maintenance and operation. TRIMING aims to rehabilitate existing large-scale irrigation schemes through facility rehabilitation, rebuilding ownership and maintenance of the beneficiary water users' associations (WUAs) by strengthening participatory water management, as well as improving agricultural productivity. FMWR plans to expand TRIMING's model of participatory water management throughout the country. Technical cooperation is also provided in TRIMING to promote participatory water management, and if a Japanese project loan is provided for irrigation development, a solid technical cooperation should be combined with the project.

(2) Post-harvest Infrastructure

1) Storage Facility⁷⁴

For grains, storage facilities play an important role in terms of food security, but the storage capacity for wheat, maize, and sorghum is less than 5%, with only one to two weeks of national stockpiles, making them highly sensitive to international markets. In addition, USDA and FAO estimate that 30% and 10% of production is lost after harvest, respectively. In response, various storage methods have been employed, including traditional storage facilities at the farm level (see figure on the right). Silo is a modern large-scale storage facility for industrial use, and warehouse is a common building used by traders to store bagged grain. Air tight drums are sealed drums, used by farmers and traders. Rhombus are traditional raised floor storage made of soil and plant fiber, used by farmers. Others are 100 kg sacks. According to one study, 52% of maize is lost as food loss after harvest, 36% of which is lost during storage due to rodents, insects, and moisture deterioration.

In terms of policy, the National Agricultural and Food Stockpile Program was launched in 1987 (a three-step program consisting of a strategic grain stockpile operated by the federal government, a buffer stockpile operated at the state level, and a field stockpile undertaken at the farmer level). At state-run facilities, the federal government purchases grain from traders and farmers and stores them, and distributes them to victims in the event of a disaster or other emergency. State-run facilities are

outsourced to the private sector and are used for business purposes. Separately, storage is also carried out by the private sector for business purposes. The grain storage facilities listed in the National Report of Wet Season Agricultural Performance in Nigeria (hereafter APS) 2021 have a total capacity of approximately 2 million tons at 227 locations across the country. The total capacity of grain storage facilities managed by each state government is approximately 680,000 tons, while those managed by the federal government under direct control total 650,000 tons, and those managed by the private sector under concession total 690,000 tons. The total capacity of the federal government is about 650,000 tons directly managed by the federal government, and about 690,000 tons privately managed by the private sector under the concession system. It generally covers the entire country and plays an important role in food security. However, its operation has varied widely from region to region, and many facilities have

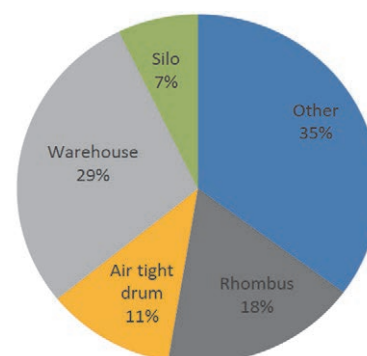


Figure 2-50 Percentage of storage methods

Source: PPP Transaction For 33 Silo Complexes In Nigeria, Business Case, FMARD, 2016



Figure 2-51 State-run silos⁷⁵

⁷⁴ If there is no specific explanation, the source is PPP Transaction For 33 Silo Complexes In Nigeria, Business Case, FMARD, 2016

⁷⁵ Strategic Food Reserve in Nigeria, An Assessment of Optimal Stock Levels and Storage Capacity, AGRA, March 2023

not been operated efficiently. Although the government is aiming to introduce a concession system, the operation has not been handed over to a private company as of 2020.⁷⁵

Table 2-65 Public grain storage facilities by region

Region	No.	Capacity, ton			
		Total	State	Federal Government	
				Government	Concession
North East	33	230,430	30,430	150,000	50,000
North West	61	724,600	399,600	125,000	200,000
North Central	40	419,000	133,000	125,000	161,000
South East	37	210,260	60,260	100,000	50,000
South West	38	227,430	27,430	25,000	175,000
South South	18	200,620	25,620	125,000	50,000
Total	227	2,012,340	676,340	650,000	686,000

Source: APS 2021

On the other hand, new efforts are being made in the private sector. While 47% of farmers reportedly do not have access to storage facilities, AFEX owns 120 warehouses, equivalent to 350,000 tons, in 24 states in the country to meet farmers' needs. With its own extension staff, AFEX organizes farmers to store their harvest in its warehouses in nearby locations. Farmers pay a fee based on the number of bags and months to store, and the harvest is treated as collateral, so farmers can secure funds from AFEX or their partners. Farmers can also sell to AFEX or partners. AFEX is doing business in Kenya since 2022.⁷⁶

Another Nigeria-based social enterprise, ColdHubs Ltd. is deploying solar refrigeration facilities in 30 horticultural crop markets across the country. Users pay a fee based on the number of crates (20 kg equivalent) and number of days they are kept, and ColdHubs operates and maintains the facilities.⁷⁷ In the first four years, the company handled 42,000 tons of fruits and vegetables, served 5,250 users, and received the "Cooling as a Service" award from the Basel Sustainable Energy Agency (BASE) of Switzerland in August 2020.⁷⁸

2) Processing Facility

There are 170 processing facilities for major crops listed in APS 2021 across the country, with rice facilities accounting for the largest number (57), followed by cassava facilities (48). Other facilities include 10 grain facilities in the north and 10 palm oil facilities in the south. Although the owner/managing entity is not specified, it can be inferred that the majority of the facilities are privately owned, given that the names of the facilities are mostly proper nouns. Although some states are not listed, some states do not include figures, and some states do not classify processing crops, the list

⁷⁶ The Warehouse Solution: Why Smart Storage is the Key to Africa's Food Security, Next Billion, 2022.11.7

⁷⁷ Solar-powered cold-storage and agrifood market modernization in Nigeria, Agricultural Economics, 2023.3.2

⁷⁸ ColdHubs: Expanded 100 R290 refrigerated warehouses in Nigeria, Accelerate Advancing Clean Cooling, 2021.10.29

generally covers the entire country.

Table 2-66 Agro-processing facilities by region

Region	Total No. of Plants	Processing Products							
		Rice	Cassava	Soy, maize, other grains	Other Food Crops	Oil Palm	Other Industrial Crops	Fish	Others, Unknown
North East	20	10	1	8	0	0	0	0	1
North West	10	7	0	1	0	0	0	0	2
North Central	34	19	9	1	2	0	2	1	0
South East	10	6	2	0	0	0	0	2	0
South West	42	8	25	0	1	4	1	3	0
South South	54	7	11	0	2	6	2	0	26
Total	170	57	48	10	5	10	5	6	29

Source: APS 2021

The processing of agricultural products has various advantages, such as reducing post-harvest losses, developing small businesses, improving food quality, competing with imports, and reducing excessive use of preservatives, etc. With a growing urban population and a rapidly developing middle class, food processing sector in Nigeria is expected to be a \$20 B/year market and to grow further. However, the food processing sector in Nigeria is limited to world-standard general food products such as beverages, biscuits, instant noodles, etc., and there is no small-scale or local but distinctive food processing. The three main factors are lack of knowledge, absence of contract producers (copackers), and lack of funds. As for the lack of knowledge, educational institutions and training programs focus on theoretical lectures, with little opportunity for practical experience through the use of modern equipment, so it makes the sector difficult to develop industrially. Regarding the absence of contract producers, start-ups are growing rapidly in Europe, US, China, and other countries using contract producers, and they are also required in Nigeria. Regarding the lack of funding, there are high-interest bank loans and other sources, but beyond that, a funding ecosystem similar to the ones found in Europe and US is required for scaling up.⁷⁹

The Green Imperative Programme (GIP), a bilateral cooperation program between Nigeria and Brazil, is underway, in which 142 agro-processing plants are planned to be built in Senatorial districts across the country.⁸⁰ The GIP is a B\$1.2 assistance program that started in 2019, and in addition to the construction of processing plants, the program is also supposed to provide a wide range of assistance, including the provision of 10,000 tractors and technical cooperation.⁸¹ However, during the first field survey in June 2023, FMARD officials said that the GIP had not substantially begun.

⁷⁹ If there is no specific explanations, the source is Creating Food Processing Opportunities in Nigeria, Institute of Food Technologists, 2020.3.1

⁸⁰ FG plans to establish 142 agro-processing centres, Premium Times, 2020.6.20

⁸¹ New agric minister must hit the ground running with \$1.1bn Green Imperative Fund, Business Day, 2021.9.15

(3) Distribution Infrastructure

1) Road⁸²

The total length of roads in Nigeria is approximately 200,000 km, of which 35,000 km (18%) is under the federal government, 30,000 km (16%) under state governments, and 130,000 km (66%) under local governments. They are called Trunk A, B, and C, respectively.

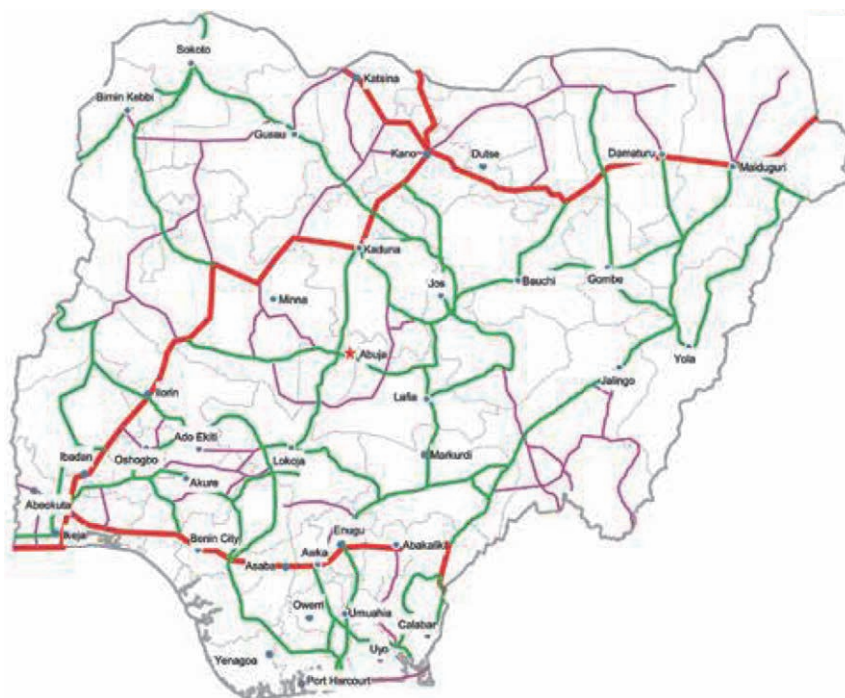


Figure 2-52 Nigeria's main road network

Source : Reviewed National Integrated Infrastructure Master Plan, Federal Ministry of Finance, 2020

Trunk A is an arterial road connecting neighboring countries, major cities, etc. It is under the jurisdiction of the Federal Ministry of Works and Housing (FMWH), and operation and maintenance are handled by the Federal Road Maintenance Agency (FERMA). Although 97% of the roads are paved, 40% are in poor condition and in need of rehabilitation. Trunk B is a major regional road, and is under the jurisdiction of the state government departments in charge, but overall, about 80% of the road is considered to be in poor condition. Trunk C is under the jurisdiction of the local government departments in charge, but there are few paved roads, and nearly 90% of the roads are considered to be in poor condition due to the heavy influence of rainfall and other factors. The poor road conditions rebound to the cost of transporting agricultural products.

⁸² If there is no specific explanations, the source is Reviewed National Integrated Infrastructure Master Plan, Federal Ministry of Finance, 2020

Table 2-67 Type, length and condition of roads

Management	Trunk	Length, km	Ratio of Length,	Condition, %		
				Good	Fair	Poor
Fed.Gov.	A	35,000	18	27	30	40
State	B	30,500	16	22		78
Loc.Gov.	C	129,577	66	13		87
Total		195,077	100			

Source: Made by the Survey team based on Reviewed National Integrated Infrastructure Master Plan, Federal Ministry of Finance, 2020

The road network is responsible for 90% of cargo transport, but there is significant congestion in urban areas and near ports. The national average of number of cars per road length is 11 vehicles/km, but in Lagos, for example, the number is 222 vehicles/km, more than 20 times the number. Of the road length, 30,000 km are located in urban areas. The road density is 0.21 km/km², far from the desirable 1.0, but much higher than the average of 0.06 in Western and Central Africa, and on the same level as in South Africa and Indonesia. However, inadequate maintenance and management are deteriorating the functioning of the road network.⁸³

Challenges cited include lack of funds for construction and maintenance, private funding, lack of resources for preventive maintenance, increased load on roads due to increased traffic, budgets not available in time for the dry season suitable for construction, overloading of trucks, and malfunctioning drainage systems.

Efforts to improve rural roads include the Rural Access and Agricultural Marketing Project (RAAMP), co-financed by WB (\$280 million) and AFD (Agence Française de Développement, France) (\$230 million) and implemented by FMARD and 13 state governments (Sokoto, Kebbi, Katsina, Kano, Bauchi, Plateau, Kwara, Kogi, Oyo, Ogun, Ondo, Abia, Akwa-Ibom). Bauchi, Plateau, Kwara, Kogi, Oyo, Ogun, Ondo, Abia, and Akwa-Ibom). Between 2021 and 2026, the project aims to build 53,730 km of 5,921 local roads (including simple maintenance), 65 agro-logistic centers (market-like facilities), and establish a State Road Fund and a Local Road Department within a state government for subsequent maintenance and management.^{84, 85} In this sector, WB, AFD and AfDB (African Development Bank) have so far implemented the Rural Access and Mobility Project in Phases 1 and 2 and significant demands continue to be anticipated.

2) Railway

Railways were overlooked as the road network developed, and their share of transport services fell to 1%. The number of users fell from 15 million in the mid-1980s to 1 million in 2007 and freight fell from 3 million tonnes in the mid-1960s to 120,000 tonnes in 2000. The share of goods carried by rail in the cargo loaded at ports fell to 0.1% in 2010.⁸⁶

⁸³ An Infrastructure Action Plan for Nigeria, Summary Report, AfDB, 2011

⁸⁴ Project Appraisal Document for Nigeria Rural Access and Agricultural Marketing Project, 2020.1.15

⁸⁵ FG, World Bank, AFD to spend \$575m on rural roads, Punch, 2022.6.20

⁸⁶ An Infrastructure Action Plan for Nigeria, Summary Report, AfDB, 2013



Source : An Infrastructure Action Plan for Nigeria, AfDB, 2013

Figure 2-53 Train lines in Nigeria

Despite such a situation, the national railway network is operated in 3,505 km across the country, including the Lagos-Nguru line in the west and the Port Harcourt-Maiduguri line in the east. The importance of rail transport has been highlighted in recent years, so an unprecedented scale of investment has been made since 2016 by various means to revitalise the rail network.⁸⁷

Thanks to significant investment, passenger volume on railways recovered to 3.9 million in 2021.⁸⁸ Passenger numbers continued to increase steadily, but after the train explosion attack on the Abuja-Kaduna line on March 28, 2022, people avoid using railways, and in the first quarter of 2023, passenger numbers dropped 54% to 442 thousand from 953 thousand in the same period of 2022.⁸⁹

However, it is assumed that railways are rarely used for transport of agricultural products, so they are not the subject of the in-depth study.

3) Ports

Performance of Nigerian ports is at a very low level compared to international standards. As of 2006, e.g. efficiency of cargo cranes was 8-9 tons/h in Nigeria, less than 1/3 compared to global standard, 30 tons/h. Efficiency of container cranes was 25-30 operations/hour internationally, while less than half at 12 operations/hour at the Apapa port in Lagos. Container waiting time was 7 days internationally, while 30-40 days at major Nigerian ports. Truck loading and unloading time was 1 hour in best practice, while 1 day in Nigeria.⁹⁰ The inefficiency was obvious. In recent years, Lagos port still ranks 260th out of

⁸⁷ If there is no specific explanations, the source is Reviewed National Integrated Infrastructure Master Plan, Federal Ministry of Finance, 2020

⁸⁸ NRC transported 3.9m passengers in 2021, Trust Radio Live, 2022.6.8

⁸⁹ Nigeria rail stutters on passenger decline, rising dollar debt, Business Day, 2023.7.8

⁹⁰ An Infrastructure Action Plan for Nigeria, Summary Report, AfDB, 2011

348 ports in the world in terms of efficiency, but there has been some improvement in the average time required to enter the port, which is 4.7 hours, down from 12.2 hours of the previous year.⁹¹



Source : An Infrastructure Action Plan for Nigeria, AfDB, 2013

Figure 2-54 Nigeria's major existing and planned seaports and major inland water routes

The impact of congestion around the main port of Apapa and delays in container loading operations in the port has been severe, putting exporters at a high cost disadvantage.⁹² Hibiscus exporters said they utilised Port Harcourt, the capital of the Eastern Rivers State, to avoid defaulting on contracts due to delays. However, loading and unloading is quicker, but the fees are higher and security along the way is poorer.⁹³

On the other hand, the Lekki deep-sea port was completed in October 2022 and expected to be fully operational in 2023.⁹⁴ In addition, since 2000, private management of port facilities through the concession system has been actively introduced to improve the efficiency of port operations, which is expected to contribute to economic development.

⁹¹ <https://www.jetro.go.jp/biznews/2023/05/d45433146e9e0cc2.html>

⁹² Data Collection Survey on Food Value Chain Development for Food Security and Nutrition Improvement in Sub-Saharan Africa, JICA, 2020

⁹³ <https://thenationonline.net/tackling-hibiscus-export-ban-to-mexico/>

⁹⁴ <https://www.jetro.go.jp/biznews/2022/12/5f52a9cc2d4c2398.html>

(4) Collection/Marketing Infrastructure

1) General

Within NATIP, the government has set out to strengthen the functionality of agricultural markets, and in addition to strengthening the distribution infrastructure, it aims to strengthen ties among VC-related parties, utilize warehouse securities, and establish a market information system. Through these measures, NATIP aims to improve the efficiency of agricultural product distribution, reduce price fluctuations, and standardize and improve the quality of agricultural products.

In 2011, there were estimated to be 2,000 traditional markets across the country, and 65% of food products were sold to consumers at these markets.⁹⁵

APS 2021 has a list of major livestock markets (cf. table on the right), but there is no information on market facilities for other agricultural and fishery products. According to FAO data⁹⁶, of the 10 major markets in Lagos, one is a livestock market, two are fish markets, and the other markets sell various products such as vegetables, grains, tubers, and fish. In addition to permanent markets, there are many regular markets in rural areas.

With the recent increase in VC support, many projects are building market facilities alongside agroprocessing facilities. Within IFAD's Value Chain Development Programme (VCDP), 39 small markets have already been built as of 2019, and it is planned to build 120 more facilities.⁹⁷ The previously mentioned RAAMP also plans to build 65 agro-logistics centers. The challenges of these market facilities are detailed in "4.3 Status and Challenges of Agricultural Infrastructure Contributing to Value Chain."

Table 2-68 Major livestock markets

Region	No. of Mkt
North East	52
North West	44
North Central	74
South East	62
South West	94
South South	38
Total	364

Source: Made by the Survey team from APS, 2021

2) Special Agro-Industrial Processing Zones (SAPZs) Programme⁹⁸

SAPZs aim to promote agribusiness by establishing a center where agricultural products and many stakeholders involved in agriculture, including those in the private sector, are concentrated. The SAPZ will be established in areas with high agricultural potential, equipped with the necessary infrastructure, and will bring together all stakeholders involved to improve efficiency and reduce costs. Led by the AfDB (Africa Development Bank) and started in 2022, this is a large project worth \$ 538 million and the investors are listed in the table below. The project is positioned as Phase 1 covering 8 states including FCT.

⁹⁵ Steady Growth of Nigeria's Retail Food Sector, USDA, 2011

⁹⁶ Urban food systems, food security and nutrition in West Africa, Lagos Nigeria, FAO, 2017

⁹⁷ Agricultural Market Development, Value Chain Development Program, FGN & IFAD, <https://vcdpnigeria.org/agricultural-market-development/>

⁹⁸ If there is no specific explanations, the source is Program Appraisal Report, Special Agro-Industrial Processing Zones Program – Phase I, AfDB, 2021.11

Table 2-69 Investments of SAPZ Phase 1

Organization	Amount M\$	Target states
Africa Development Bank (AfDB)	160	Ogun, Oyo, Kaduna,
Africa Growing Together Fund (AGTF)	50	Cross River, Imo
Islamic Development Bank (IsDB)	150	Kano, Kwara, FCT
International Fund for Agricultural Development (IFAD)	100	Comp. 2 of Kano, Ogun
Green Climate Fund (GCF)	60	
Federal Government of Nigeria (FGN)	2	-
State governments	16	-
Total	538	

Source : Made by the Survey team based on Program Appraisal Report, Special Agro-Industrial Processing Zones Programme – Phase I, AfDB, 2021.11

It has four components; Component 1 is infrastructure development and management of Agro-Industrial Hubs (AIHs). Component 2 is agricultural production and productivity enhancement. Component 3 is policy and organizational development, and Component 4 is program operation and management. Phase 1 will build one AIH in each state and develop 15 Agricultural Transformation Centers (ATCs) and several Aggregation Centers (ACs), as well as strengthen the capacity of MSMEs.

According to interviews, progress has been delayed due to COVID-19, but the actual budget allocation is scheduled to begin in late July. Phase 2 is currently being planned and is scheduled to start by the end of this year. The demand for funds is enormous, including additional project costs for Phase 1 and Phase 2, and JICA's participation would be welcomed.

(5) Research/Extension/Training Infrastructure

Although Nigeria is the leading investor in agricultural research in sub-Saharan Africa, it has been shrinking in recent years. In 2008, the investment was 0.39% of GDP of agricultural sector, while in 2014, the figure had dropped to 0.22%. As a result, the infrastructure for agricultural research has deteriorated, negatively affecting research outputs, and there is an urgent need to secure budgetary resources.⁹⁹ In addition, 90% of the budget is allocated to personnel costs, and the ratio of agricultural research expenditures to \$100 agricultural production is estimated at \$0.42, far below Ghana's \$0.94 and Uganda's \$1.4. Nigeria has one of the best agricultural research systems in Africa, with 80 government research institutes and institutions of higher education, employing 2,000 researchers, which must be effectively utilized.¹⁰⁰

Regarding extension, although there is a solid infrastructure in terms of manpower, such as the Agricultural Development Programmes (ADPs) established in each state with the support of WB in the 1980s, 7,000 extension workers nationwide, and a number of agricultural research institutes and extension linkages (Research-Extension-Farmer-Input Linkage System (REFILS)), the budget is not sufficient to support extension activities. The infrastructure in terms of manpower is solid, including

⁹⁹ ASTI (Agricultural Science and Technology Indicators initiative), Nigeria, ASTI facilitated by IFPRI, 2014

¹⁰⁰ How inadequate agric research funding undermines Nigeria's food security, BusinessDay, 2020.2.5

7,000 extension agents nationwide and a number of agricultural research institutions and extension linkages (Research-Extension-Farmer-Input Linkage System (REFILS)), but the budget is not sufficient to meet the needs of the program. More efficient dissemination methods utilizing the private sector and ICT are being sought.¹⁰¹

2.2.6 Challenges of Agricultural Sector

So far, we have discussed the current status and issues of agricultural production, farmers' organization, agricultural product distribution, agricultural finance, and agricultural infrastructure. Meanwhile, the NDP's goal is to increase productivity in the agricultural sector and improve food security, specifically improving the ranking of the Food Security Index.

In the following, we will first confirm the issues from the perspective of food security indicators, and then discuss issues in the agricultural sector at each stage of VC: production, post-harvest and rural distribution, distribution from production areas to consumption market, and processing.

(1) Food Security Index

The food security index is compiled by The Economist Newspaper, which compiles related indicators, converts them into scores for international comparison, and publishes rankings for each country. The indicators consist of four categories: Affordability, Accessibility, Quality and Safety, and Sustainability and adaptation. According to the 2022 index, Nigeria ranks 107th out of 113 countries worldwide, and ranks low among sub-Saharan countries at 25th out of 28 countries. In particular, Nigeria ranks low in Affordability, 28th out of 28 countries, and Availability, 26th out of 28 countries. The table below specifically lists the sub-items of these two categories that are below the average of the 28 Sub-Saharan countries.

Table 2-70 Food Security Index

Index 2022	Ranking (All countries)	Sub-Saharan Africa countries	Detail items and sub-items () where Nigeria is behind mean average of Sub-Saharan countries
Overall score	107/113	25/28	N/A
Affordability	113/113	28/28	• Change in average food costs • Proportion of population under global poverty line • Food safety net programmes
Availability	108/113	26/28	• Access to agricultural inputs (Agriculture producer prices, Access to extension services, Community organizations) • Agricultural research & development • Supply chain infrastructure (Air, port and rail infrastructure) • Sufficiency of supply (Dependency on chronic food aid) • Political and social barriers to access (Armed conflict, corruption, gender inequality) • Food security and access policy commitment (Food security strategy, Food security agency)

¹⁰¹ Nigeria: In-depth Assessment of Extension and Advisory Services, USAID and others, 2017.3

Quality and safety	79/113	7/28	• Skipped
Sustainability and adaptation	57/113	8/28	• Skipped

Source: The economist newspaper, Food Security Index 2022

In terms of affordability, it is rated at the bottom, mainly due to the high rate of increase in food prices. The low evaluation of Affordability is understood to be due to Availability, or problems on the food supply side (mainly agriculture). Among the components of Availability, components of “Access to Agricultural input” such as Agriculture producer price (negative sales price increase rate for farmers), Access to extension services, and Community organization are below the Sub-Saharan average. Agricultural research & development is also below average.

One of the main factors contributing to Nigeria's food security problem can be said to be the productivity challenge across agricultural VCs. Below, we will summarize the factors that are causing inefficiency and bottlenecks at each stage of VC: production, post-harvest and rural distribution, distribution from production areas to consumption market, and processing.

(2) Production

Inefficiency at the production stage is concentrated in unit yield. Comparing the unit yields of major crops with neighboring countries, Unit yield of Nigeria for 7 out of 10 major grains are less than the average of neighboring countries and the productivity of vegetables such as tomatoes is generally lower. Based on the current situation and issues described so far, the underlying factors causing the inefficiency at the production stage are discussed as following.

Extension activities

Many agricultural technology dissemination schemes such as ADP are often operated relying on funds from donor agencies, and there are only a limited number of organizations that are able to operate solely on their own funds or subsidies from state governments. Appropriate dissemination activities are not carried out. Since budgets are limited, it is necessary to improve the efficiency of the extension activities and involve the private sector.

Seed variety

The production capacity of NASC-certified cooperatives is low. NASC's budget is insufficient for monitoring function, making it difficult to suppress the use of fake seeds. It is necessary to disseminate information through extension activities and corporate activities so that farmers themselves understand the importance of semi-formal and formal seeds.

In addition, distribution and inventory management costs are high in the distribution and sale of seeds, resulting in the high price of seeds for farmers. It will be necessary to improve the predictability of demand and increase the inventory management efficiency of seed dealers.

Access to agricultural machinery

Tractors and other expensive agricultural machinery are owned by medium- and large-scale farmers and investors, while small-scale farmers and groups use them on rent. The number of tractors in operation in Nigeria is insufficient. Although it is estimated that there are currently around 7,000 tractors, this is not enough considering the area of agricultural land, and delays in agricultural work caused by a lack of agricultural machinery are causing low yields. Due to low supply, rental costs typically amount to N 150,000/ha, accounting for a large portion of farmers' production costs. On the other hand, agricultural machinery platforms provide services at around N 45,000/ha by streamlining supply and demand matching. It is considered effective to promote agricultural machinery investment via a platform.

Another supply constraint is the lack of tractor operators, lack of repair workers, and access to spare parts. Although there will be some improvements as the market expands, it would be effective for the government to support human resource development in order to promote the development of the agricultural machinery ecosystem and increase the stable income of workers.

Financing for investments by farmers and producers

In interviews, many stakeholders commented that high borrowing interest rates are an obstacle for farmers to expand production. In fact, when small-scale farmers borrow short-term loans from MFBs, the annual interest rate is often around 60%. Based on the average production cost and sales price for each crop that we have already seen, interventions such as program loans can be used to reduce the repayment burden when farmers attempt to increase production by procuring 80% of the equivalent amount of input materials with loans. We compared the repayment burden of farmers between the case without intervention and the case supported by intervention program loans typically applied in Nigeria, in which loan interest rate is 9% and agricultural insurance subsidy are applied.

The debt service coverage ratio (DSCR), which is one of the indicators used by banks when considering repayment risk, will improve to a level close to the target of 1.4 for sorghum, cassava, millet, cowpea, and tomatoes as a result of the intervention. However, lowering interest rates on working capital for cultivation alone is not sufficient, and small-scale investments (with a period of more than one year) that increase yields are also considered necessary.

Table 2-71 Borrowing burden of farmers for farm production

Crops	Cost (N/ha)	Production n months	Unit sale price (N/kg)	Unit yield (Ton/ha)	Sales (N/ha)	Gross profit (N/ha)	No intervention			With intervention			Change of DSCR	Decrease in cost of borrowing (N/ha)
							Borrowed amount (N/ha)	Cost of borrowing (N/ha)	DSCR	Borrowed amount (N/ha)	Cost of borrowing (N/ha)	DSCR		
Rice	275,000	6	524	1.93	1,011,320	736,320	220,000	79,200	2.5	220,000	18,700	3.1	0.62	60,500
Maize	233,000	3	259	2.12	550,168	317,168	186,400	39,144	1.4	186,400	11,650	1.6	0.20	27,494
Sorghum	128,000	4	237	1.18	279,613	151,613	102,400	26,624	1.2	102,400	7,168	1.4	0.21	19,456
Yam	582,000	8	117	8.54	998,642	416,642	465,600	214,176	0.6	465,600	46,560	0.8	0.20	167,616
Cassava	278,000	8	85	6.94	589,679	311,679	222,400	102,304	1.0	222,400	22,240	1.3	0.31	80,064
Millet	111,000	3	246	0.96	236,406	125,406	88,800	18,648	1.2	88,800	5,550	1.3	0.16	13,098
Cocoyam	355,422	7	508	3.90	1,981,200	1,625,778	284,338	116,578	4.1	284,338	26,301	5.2	1.18	90,277
Potatoes	272,000	3	140	3.81	533,750	261,750	217,600	45,696	1.0	217,600	13,600	1.1	0.14	32,096
Soybean	130,000	7	490	0.93	453,936	323,936	104,000	42,640	2.2	104,000	9,620	2.9	0.64	33,020
Cowpea	178,000	3	523	0.77	403,599	225,599	142,400	29,904	1.3	142,400	8,900	1.5	0.18	21,004
Tomatoes	262,000	4	130	4.23	550,394	288,394	209,600	54,496	1.1	209,600	14,672	1.3	0.19	39,824

Note: DSCR: Debt Service Coverage Ratio = Gross profit ÷ (repayment principal + interest payment). The interest rate was set at 60% per annum without intervention and 9% per annum with intervention, and for agricultural insurance, it was set at 4% of variable costs without intervention and 2% with intervention.

Another issue is that farmers may be wary of taking risks and investing due to conflicts between nomadic herders and settled farmers.

If farmers are encouraged to invest in sustainable production increases, it will be easier for seed producers and distributors to predict the market demand, which will lead to increased supply and improved distribution efficiency.

Financial and commercial literacy of farmers

Additionally, farmers may be hesitant to invest even when interest rates are low due to their lack of financial knowledge and the risks of not having a specific sales target (more details will be discussed in Chapter 3). On the other hand, from the point of view of anchor companies and farmers engaged in contract farming on the purchasing side, there is a risk that farmers may divert their harvests and sell them to a third party. For farmers, especially those who are mainly self-sufficient, it is considered necessary to improve financial and commercial transaction literacy before or at the same time as accessing commercial value chain and finance.

Agricultural cooperatives

In Nigeria, the support system provided by agricultural cooperatives to farmers is insufficient. The lack of specific legal regulations and penalties for societies to participate in higher-level organizations has left them in a state of non-participation. For this reason, it is difficult for agricultural cooperatives to accumulate capital, and according to interviews, even in registered cooperatives, the accumulation of cooperative assets is often limited to small amounts of cash and small equipment. According to the results of the rural socio-economic survey described in Chapter 3, farmers who have experience of participating in farmer groups or contract farming tend to have higher financial literacy and a stronger intention to invest. Agricultural cooperatives with a strong asset base are more likely to gain the trust of purchasing companies and financial institutions. From this point of view, the problem of weak agricultural cooperatives is considered to be one of the causes of inefficiency at the production stage.

Irrigation facilities

Crops with low unit yields are based on rain-fed agriculture and can be improved by shifting to irrigated agriculture. For example, the introduction of irrigation increases the unit yield of rice by 42% and maize by 30%. On the other hand, some estimates suggest that only 4.2% of the total irrigable area in the entire country is irrigated. Expanding irrigation development is one of the challenges on the production side.

Among irrigation facilities, small-scale irrigation facilities that use nearby rivers and wells have great effects, such as improving the unit yield of tomatoes and making double cropping possible, but the realization of the investment for this purpose is difficult to achieve unless funding challenges are addressed.

(3) Post-harvest and rural distribution

At the post-harvest and rural distribution stage, the issues are thought to be reflected and concentrated in the high loss ratio, which is also adopted as a KPI of the NDP. The table below compares Nigeria's waste loss ratio with the average of eight neighboring countries for each comparable item. As a result, Nigeria has higher loss ratios for rice, potato, cocoyam, cowpea, groundnut, sesame, tomato, vegetables, cocoa and plantain. It shall be noted that, since FAO STAT's Food Balance statistics are used to compare countries, the loss ratio is the ratio of loss and waste to the total supply, which includes processed products, so it is different from the level of the loss ratio for only agricultural products, which is often mentioned as an example.

Table 2-72 Comparison of loss ratio between Nigeria and the neighbor countries

Area	Loss ratio_Rice	Loss ratio_Millet	Loss ratio_Sorghum	Loss ratio_Cassava	Loss ratio_Potato	Loss ratio_Yam	Loss ratio_Oyam	Loss ratio_Cowpea	Loss ratio_Cowpea	Loss ratio_Cowpea	Loss ratio_Soybeans	Loss ratio_Groundnuts	Loss ratio_Sesame seed	Loss ratio_Tomatato	Loss ratio_Veg etable other (Okra)	Loss ratio_Cocoa beans	Loss ratio_Spices other (Ginger)	Loss ratio_Plantains
Nigeria	12.3	4.3	11.6	4.5	7.6	7.4	10.0	30.0	10.5	4.0	5.1	7.3	8.9	13.4	10.3	5.4	9.7	8.2
Average of others	5.4	14.0	14.6	11.1	8.0	5.9	10.7	14.9	5.1	5.2	20.0	6.3	1.9	6.3	8.1	3.3		8.0
Benin	5.8	25.2	25.9						9.4	14.7	6.0	1.7		3.1	7.0			
Ghana	4.7	14.8	11.2	15.8		16.4	33.0	7.6	5.3	2.7	53.2	3.1		3.4	8.0			8.0
Guinea	17.5	23.2	20.4		5.9	6.5		7.6	5.3	2.7		20.0			8.2	4.2		
Cote d'Ivoire	7.1	13.8	11.4	12.5	5.0		7.5	7.4	6.3	3.3		6.8		5.5	9.5	3.3		
Liberia	3.2				7.9		9.5	13.8							7.6	5.9		8.0
Senegal	1.8	8.5	15.2	14.6	15.0	8.9	6.3		4.9	6.3		2.3	2.4	5.8	8.8			
Togo	2.5	8.1	7.4	8.2			12.5		4.5			7.7			7.9	0.0		
Burkina Faso	0.7	4.6	10.4	4.4	6.1	2.3	13.8		4.6	3.6	0.9	2.3	1.4	13.9	7.9			

Note: Data is for 2020. Data of countries of which production is less than 10 thousand for each crops are omitted. Unit: %, tons of loss / tons of total supply (production + import + stock variation). Items in which loss ratio of Nigeria is larger than average of the neighbor countries are highlighted in dark brown
Source: FAO Stat

Based on the current situation and issues described so far, factors affecting the inefficiency in the post-harvest and rural distribution will be summarized in the following.

Primary processing facilities, storage facilities

Smallholder farmers store their produce in traditional ways such as baskets, bags and sheds, but lack the ability to control humidity and pests. The challenge for small-scale farmers is to promote linkage to sales channels, which will be discussed in the next section, and to promote investment in small-scale facilities (storage, primary processing) through unionization. Among medium-sized and large-scale storage facilities, those that the state government invests in and outsources to the private sector are faced with a lack of funds to renovate aging facilities. Facilities with private investment need to be expanded by facilitating access to capital and VC.

One possible direction for improvement is to promote private investment in conjunction with SAPZ development led by the AfDB.

Linkage to sales channels

Survey results show that the average distance from farmland to the nearest drivable road is about 14 km, making it difficult for farmers to carry out production activities based on market information as they rely on intermediaries. Fresh vegetables tend to be discarded or sold at low prices due to a mismatch in supply and demand. The challenge is to encourage start-up companies to support farmers, form small-scale farmers into cooperatives, and participate in contract farming. In doing so, it is also necessary to improve farmers' commercial literacy and eliminate problems such as side sales.

Transport to local market

Small-scale farmers commonly use overhead transport, livestock, motorbikes, and bicycles to carry their products to a rural market. The challenge is for farmer groups to raise funds for high-quality baskets, small trucks, etc. Transport companies also suffer from quality deterioration during transportation due to poor quality and damaged roads. The rehabilitation of local roads is supported by RAAMP.

(4) Distribution from production area to consumption market

In Nigeria, the main production areas for agricultural products are concentrated in the north, while the main consumption areas are located in the south, so much of the distribution from production areas to consumption areas is carried out by long-distance truck transportation. However, due to problems with road quality, transportation tends to take many days and increase transportation costs.

Table 2-73 Transportation costs in Nigeria and neighboring countries (re-exhibited)

Route	Transportation cost (USD/ton/km)
Lagos to Kano	0.09
Cotonou to Niamey	0.08
Lome to Ougodougou	0.07
Abidjan to Bamako	0.06

Source: The Cost of Transporting Cereals in West Africa (International Food Policy Research Institute, September 2018)

Long transportation times tend to lead to low freshness and poor road conditions cause quality deterioration due to vibration, which has the negative effect of suppressing farmers' selling prices and increasing waste.

(5) Processing

Food processors are affected by low productivity of the agricultural products they procure, waste during the period between harvest and delivery, and instability in procurement quantities due to climate change. As a result, problems such as the operating rate of a tomato primary processing factory that has been launched does not reach the plan, which is a factor that hinders the expansion of VC through additional investment. Addressing the above issues from production to distribution will lead to improvements in issues at the processing stage.

Above, we have compiled the issues by agricultural VC stage, and the main points are summarized in the table below.

Table 2-74 Issues and the underlying factors at stages of the agricultural value chain

Stage of VC	Issues	
	Inefficiencies	Underlying factors of inefficiencies
Production	Unit yield is low (Cassava, tomatoes, vegetables, cocoa, in particular)	
	(1) Lack of access to good variety and mechanization service	Access to Variety : Lack of R&D equipment and facility Insufficient capacity of production cooperatives Insufficient extension & dissemination to farmers High price due to inefficient distribution Aging storage for fertilizer
		Access to mechanization service : Difficulty in financial access of platforms and investors of machineries Lack of HR of operators and mechanics, and availability of parts
	(2) Lack of access to extension services and R&D	Slow progress of R&D Insufficient extension & dissemination to farmers
	(3) Underinvestment & under accumulation of farmers and producers ¹⁰²	Small role, scale, and organization rate of agricultural cooperatives Mismatch between supply and demand of agricultural finance

¹⁰² As suggested by the above-mentioned calculation of DSCR by crop, it may be difficult for farmers to invest in increasing

Stage of VC	Issues	
	Inefficiencies	Underlying factors of inefficiencies
		(high interest rates, short loan terms, lack of collateral assets, etc.) Lack of financial literacy of farmers Conflict between nomadic herders and farmers
	(4) Lack of economy of scale of suppliers	Uncertainty of sales for suppliers Difficulty of access to reasonable finance for suppliers
	(5) Aging/ inadequate management of irrigation facilities	Lack of finance for large irrigation facilities Lack of access to finance for small scale irrigation
Post-harvest & rural distribution	High loss ratio (rice, cocoyam, cowpea, tomatoes, etc. in particular)	
	(1) Insufficiency of facilities for the drying and primary processing or storage	Lack of finance for rehabilitation of large scale storage facilities Lack of reasonable finance for private post-harvest and primary processing facilities
	(2) Lack of linkage of producers to commercial VC channels	Lack of commercial literacy of farmers Lack of trust and inappropriate contract between farmers and buyers
	(3) Poor quality of roads and means of transportation	Low quality of roads from farmers to rural market and collection points Low quality of means of transportation of farmers and producers
Distribution from production area to consumption area	Transportation costs are high	
	(1) Longer days for transportation	Low quality of roads
	(2) Price depreciation due to lost freshness, deterioration of quality due to bump on vibrations	Low quality of roads
	(3) Long waiting period required for customs clearance and port usage	The relevant government agencies are under reform of procedures
Processing	Failure to take advantage of value addition	
	(1) Low operation ratio due to unstable procurement of materials	Low productivity on production stage and high loss ratio on post-harvest stage Lack of comprehensive policy optimizing food industry and agriculture

Source: Compiled by JICA Survey Team

production at normal loan interest rates. Furthermore, from the analysis of the results of the rural socio-economic survey described in Chapter 3, even if investments are profitable, they are not realized due to problems with interest rates and loan periods. This makes it difficult for farmers to expand their production, accumulate surpluses (including accumulation as cooperative assets), and develop themselves to further improve productivity.

2.3 Agricultural policies of the Federal Government

2.3.1 Agricultural policy in recent years

Federal policies and development plans in recent years included the followings.

- The Economic Recovery and Growth Plan (ERGP 2017-20):

The goal is to "restore economic growth, invest for all citizens, and secure general competitiveness in the world", and priority sectors included agriculture, electric power, manufacturing, mineral development, and service industries. Programs in the agricultural sector were designed to promote measures such as "improvement of agricultural productivity by improving access to inputs, funds and extension services", "improvement of market access by integrating agricultural value chains", and irrigation.

- The Agriculture Promotion Policy (APP) 2016–2020:

APP aimed at achieving food security goals (achieving domestic self-sufficiency by mitigating dependence on food imports) and building agribusiness by supporting the creation of sustainable income and employment opportunities through the creation of export opportunities.

Target agricultural products for domestic use included rice, wheat, maize, aquaculture, dairy products, soybeans, poultry, fruits and vegetables, sugar.

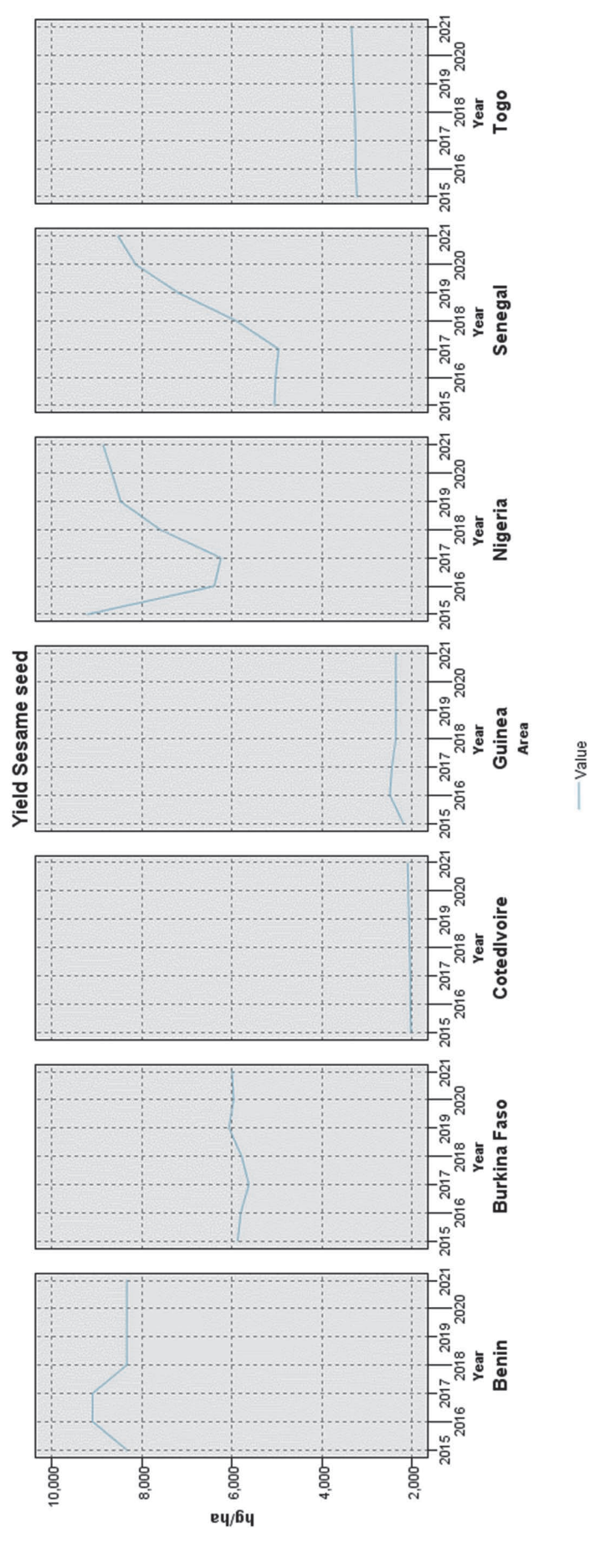
Target export items included cowpea, cocoa, cashew, cassava, ginger, sesame, palm oil, yam, fruits and vegetables, beef, cotton.

- Presidential Initiative on Fertilizer:

The aim was to leverage the private sector to produce and distribute fertilizers domestically, lowering the price of fertilizers so that farmers could purchase them at lower prices.¹⁰³

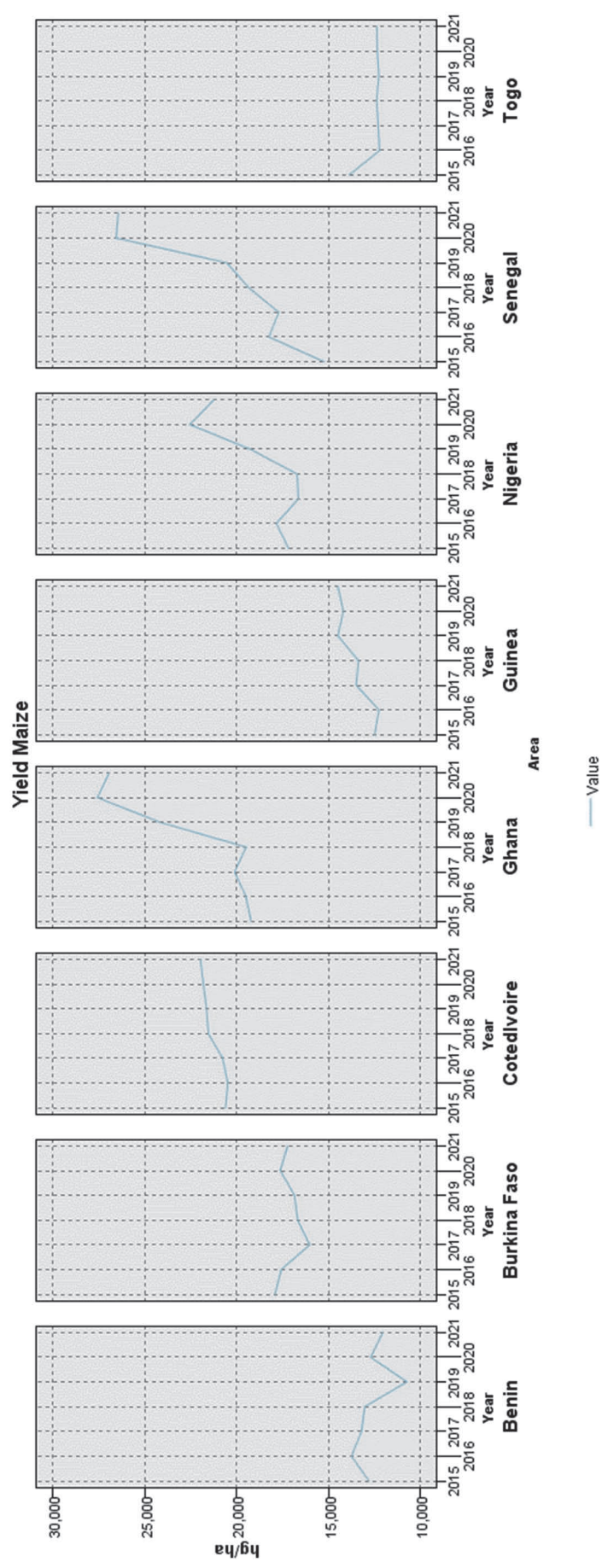
Thanks to those promotion policies, the yields of some major crops such as rice and maize have risen since 2016. However yield of most of the crops still stay lower as compared with neighboring countries. Further promotion by the policies is needed.

¹⁰³ <https://fmic.gov.ng/presidential-fertilizers-initiative-farmers-to-benefit-more-abubakar/>



Source: Made by the survey team based on FAO STAT

Figure 2-55 Yield on Sesame in comparison with neighboring countries



Source: Made by the survey team based on FAO STAT

Figure 2-56 Yield on Maize in comparison with neighboring countries

National Development Plan (NDP, 2021-2025)

According to the NDP, although the agricultural sector is the most important sector in terms of GDP and employment, the growth rate has slowed recently. It is pointed out that there are some challenges with farming practices, linkages with manufacturing and exports, and that budget allocation to the agricultural sector is insufficient. On the other hand, as an opportunity, its diverse agro ecological zones that support the production of various food and cash crops and its young population means high potential to contribute to economic growth, wealth creation and employment. In this current assessment, NDP's goal in agricultural sector for 2025 is to increase agricultural productivity and contribute to economic growth and food security.

Low agricultural productivity is attributed to poor distribution of improved agricultural inputs, reliance on rain-fed agriculture, low mechanization rates, and weak linkage of research and extension services to farmers. In addition, the lack of infrastructure and problems in storage and transportation causes a high waste rate (20% to 60%), resulting in rising food prices and inadequate nutrition of the people. In terms of finance, NDP points out the lack of access to funds with long repayment periods and funding costs that match the profitability and cash flow of agricultural investment. In addition, NDP points out the conflict between farmers and herders, climate change and environmental factors affecting agricultural productivity, and various constraints to land ownership and use hindering stable business planning.

On the other hand, NDP takes it granted that one of the Nigeria's strengths is that it produces a wide variety of crops for both domestically consumption and export, making it easier for the agricultural sector to withstand volatility in the economy and production environment. This is evidenced by the fact that the agricultural sector performed positively even during times of negative economic growth¹⁰⁴. NDP sees that expanding the market by enhancing linkages between agriculture-related companies and farmers/agricultural production and expanding access to the export market is a great opportunity.

Based those mentioned recognition, the KPIs for achieving the goals of agricultural sector include (1) reduction in post-harvest loss ratio, (2) expansion of cultivated land area, (3) increase of agriculture export ratio, (4) increase of participation rate of women in agriculture, (5) increase in food security ranking, (6) increase of agricultural credit ratio (against to total credit to the private sector) and (7) lowering the food-related import ratio.

Table 2-75 KPIs for Agricultural Sector in NDP

Objectives Baseline	Key performance indicators	Baseline	Target
Reduce post-harvest losses	The total amount of post-harvest	60 percent for all agricultural output	30 percent of all agricultural output
Build a sustainable food production systems	Total arable land under cultivation	34 million hectares	42 million hectares
Increase agricultural export volume	Share of agricultural exports in total exports	4.37 percent	6.12 percent

¹⁰⁴ Page 47 of NDP. "The country is endowed with arable land suitable for growing a variety of crops, both for domestic consumption and exports As evidence of the sector's resilience in both 2016 and 2020 when the entire economy recorded negative GDP growth, the agriculture sector's growth was positive."

Objectives Baseline	Key performance indicators	Baseline	Target
Increase female participation in agriculture	Share of women in n the population of women 15 years and above	19.6 percent	25 percent
Improve national food security ranking	Increase National food security ranking to top 3 in SSA and top 50 in the world ranking	92 out of 104 countries 13th of 28 countries in Sub-Saharan African	Top 50 in the global ranking Top 3 in SSA
Increase private sector investment in the agriculture sector	Bank credit allocation to agricultural activities / sector	5.1 percent of total private sector credit	10 percent of total private sector credit
Increase food self-reliance through increased productivity	Share of foods in total imports (%)	20 percent	15 percent

Source: NDP

Middle Term Plan of FMARD

The Federal Ministry of Agriculture and Food Security (FMAFS) formulated the "National Agricultural Technology and Innovation Policy (NATIP) (2022-2027)" to promote agricultural production policies through improvements in agricultural infrastructure and access to finance, aiming for further agricultural industrial development, such as improvement of productivity, production volume and quality.

NATIP has assessed e previous policies in recent years have achieved expansion of production especially in millet, sorghum, maize, cassava, rice, yams, cowpeas, oil palms and poultry, while supply of wheat, maize, rice, sugar, fish and beef, and dairy products depend on imports. Besides, it aims at increasing the GDP ratios of livestock, fisheries, and forestry which stay at a low level.

As a result of implementing the Agricultural Transformation Agenda (ATA, 2012-2015) and the Agricultural Promotion Policy (APP, 2016-2020), NATIP evaluated that the approaches of import substitution, value chain development, and commercialization of agriculture were effective. Having said that, NATIP aims to intensively deploy new technologies to realize agricultural potential and ensure food and nutrition security. Based on these directions, NATIP has the following 10 intervention pillars.

1. Synergy and MDA (Ministries, Departments & Agencies) Alignment:
2. Knowledge Creation and Transfer
3. Rapid Mechanization
4. Establishment of Agricultural Development Fund (ADF): as a mega-funding agency for agricultural research and training institutions, extension, technology adoption, innovation, critical value-chains development, rural agricultural development, etc.
5. Revitalization of Extension Service Delivery:
6. Livestock Development: productivity improvement and resilience, animal and aquatic diseases surveillance system
7. Strengthening Value-Chains for Priority Crops, and establishment of over 100 processing centers in rural communities; (maize, sorghum, rice, wheat, cassava, sesame, tomatoes, yam,

cowpea, soybeans, cocoa, palm oil, hibiscus, cashew, potatoes, cotton, ginger, groundnuts and sugar cane)

8. Fisheries and Aquaculture, Marine and Inland Fisheries Development
9. Market Development, A multi-stakeholder approach to equip and upgrade major commodity markets
10. Securing Agricultural Lands and Investments: Activate Joint Task Force for Partnership for Securing Agricultural Lands and Investments (PSALI)

Role of State and Local Government

- Revenue

The financial system of the Nigerian government is a structure in which budget allocations from the Federation Account (The Federation Account Allocation Committee (FAAC)) are sent to each government (Federal, State and LGA) to finance development projects and salaries of employees, etc.

Sources of income for the Federal Account include oil revenues and related taxes, income generated from trade facilitation activities of the Nigerian Customs Service, corporate income taxes, sales of state-owned assets, surpluses and dividends from state-owned enterprises, etc.

The Federal Account is distributed to the Federal, State, and LGA after deducting 13% distribution of mineral revenues to oil-producing areas, other charges and costs, and statutory deductions such as Value Added Tax (VAT). Amount allocation distributed to Federal, State and LGA are 52.68%, 26.72% and 20.60% respectively. VAT is distributed separately at 15%, 50% and 35% respectively.

Amount distributed to each of the State Governments and LGAs are determined according to the following calculation method.

- i) 40%: Allocated to 36 States equally
- ii) 30%: Allocated to States according to population
- iii) 10%: Allocated to States according to land area
- iv) 10%: Self-help of internal revenue
- v) 10%: Depends on social development factors (education: 4%, health: 3%, water supply: 3%)

In addition to FAAC distributions, the State Governments have their own Internally Generated Revenue (IGR) mainly from local taxes (income tax, royalties, road tax, etc.), registration fees, and usage fees. It is an important financial resource for implementing development projects.

LGAs impose local taxes such as transportation, peddling, market and driver's license. Deficit budgets are not permitted for LGAs. The role of the LGA is stipulated in the Constitution, and its duties are as follows:

- Education (kindergarten, primary school, etc.), health, urban and regional development planning, roads, transportation, garbage collection and disposal, cemeteries and funerals, environmental conservation, sports, leisure and parks, religious facilities, etc.

The decrees on tax collection can be found at the following website.

http://www.commonlii.org/ng/legis/num_act/tallfcd459/

Items of State Government taxation that are likely to be relevant to agriculture include:

- Personal Income Tax
- Business premises registration fee
- Right of Occupancy fees on lands owned by the State Government in urban areas of the State
- Market taxes and levies where State finance is involved
- Environmental (Ecological) Fee or Levy
- Slaughter or Abattoir Fees, where state finance is involved
- Property Tax
- Land use charge, where applicable

According to an interview with the Federal Ministry of Finance, farmers pay indirect taxes on transportation and transactions, but do not pay direct taxes (income taxes).

Items of LGA taxation that are likely to be relevant to agriculture include:

- Right of Occupancy fee on lands in rural areas, excluding those collectable by the Federal and State Governments.
- Cattle tax payable by cattle farmers only

• Policy Implementation

As a general framework, the federal government regulates research and development projects, manages funds (distribution, etc.), and subsidizes inputs and agricultural financing (agricultural subsidies) and provide dissemination services. Local governments (LGAs) are also responsible for the actual provision (implementation) of various agricultural services.

The table below summarizes the specific cases based on the interviews conducted during the field survey.

Table 2-76 Federal & State Government Roles in Farmer Support, Infrastructure and Finance

Items	Federal	State	LG
Farmer support			
Extension	Training for ADP (Agricultural Development Programme) staffs (including Research-Extension-Farmer-Input Linkage System (REFILS))	Budget allocation to ADP, Monitoring of ADP activity	NA
Farmers Database (DB)	NA	Creation and management of farmer DB (including farmer name, mobile phone number, LG name, gender)	Creation and management of a more detailed farmer DB (including farmland locations)
Subsidy system	Allocating the budget necessary for subsidies, managing subsidies and subsidy programs	Allocating the budget necessary for subsidies, managing subsidies and subsidy programs	Allocating the budget necessary for subsidies, managing subsidies and subsidy programs
Infrastructure			

Items	Federal	State	LG
Production base	Planning, construction of national irrigation districts (RBDA is responsible for operation and maintenance)	Planning, construction, operation and maintenance of state-owned irrigation districts	Local issues
Post-harvest	Planning, construction, operation and maintenance of national grain storage facilities	Planning, construction, operation and maintenance of state grain storage facilities	Local issues
Distribution	Construction, maintenance and management of national highways and interstate roads	Construction and maintenance of local roads in the state	Local issues
Collection and sales		Operation of public market	Operation of public market
R&D	R&D and Educational institutes	NA	NA
Finance			
Supervision	Commercial banks, MFB	Credit cooperatives	
Program finance	Funding, implementation and monitoring	Financing, implementation and monitoring when credit cooperative is a PFI	Local issues

Source: Created by the Survey team

2.3.2 Setting priority agendas by the new president

While the agricultural policies described in the previous section have been pursued in recent years, a new president took office in May 2023 and set forth a Renewed Hope Agenda. The Renewed Hope Agenda consists of eight priorities, four of which are relevant to the agricultural sector: 1) food security, 2) economic growth and job creation, 3) poverty eradication, 4) Inclusivity (Youths and Women) and enabling environment for individuals, groups, and the private sector to participate in governance and economic activities

In addition, actions with these priorities in mind are listed as Immediate priority actions (ongoing to the end of 2023), Short term priority actions (2023-2024), Medium term actions (2024-2026), and Long term actions (2024-2027), which are broken down by sector and organized in the table below.

The table shows that Production (crops) and Production (livestock) are mentioned in all immediate priority/short term/medium term/long term actions, indicating the importance placed by the new president. Digitalization (short term/medium term/long term), Planning/Institutional design (immediate priority/short term/medium term), Institutional reform (short term/medium term/long term), and Partner collaboration (short term/medium term/long term) are also mentioned in each of the three action periods, and it is conceivable to be second in importance after Production (crops) and Production (livestock).

Although the issues of agricultural sector at each VC stage (production, post-harvest processing and distribution at the production site, distribution from the production site to the consumption site, and

processing) are summarized in Section 2.2.6 "Summary of Issues", some of the actions summarized below are in response to those issues.

Table 2-77 List of actions with priority agendas in mind

Immediate priority actions (ongoing to the end of 2023)	Short term priority actions (2023-2024)	Medium term actions (2024-2026)	Long term actions (2024-2027)
• Certification of planting materials for dry-season farming • Implementation of the dry season Wheat production (including production of fertilizer and training for extension workers) • Arrangements for dry season farming of rice, maize and other horticultural crops • Reviewing the mechanisms and processes for delivering fertilizers and agro pesticides input to farmers	• Identifying all available vacant farmlands in various Federal Government Institutions (Universities, etc.) to bring them into food production • Reviving secondary school farms to enhance food security and agri-business enterprises	• Up-scaling and Out-scaling of various agricultural value chain projects in crops, livestock, and fisheries	• Establishment of multipurpose Input Resources & Communication Centres (IRCC), that will ensure last mile delivery of agricultural inputs while creating communication platform and co-location of e-extension services digital platforms
Production (livestock) • Distributing pasture seeds and cuttings for dry season pasture and fodder development for livestock productivity	• Developing paddocks, foliage and fodder estates for resolving clashes between farmers and herders • Enhancing the implementation of the National Livestock Transformation Plan	• Special intervention to increase productivity target of annual growth rate of 10% year on year about animal sources (Meat, dairy, eggs, fish and other protein)	• Establishment of Animal Disease Free Zones and of compartmentalization for export of livestock and livestock product • Conducting a scientific migratory pattern studies on migratory birds (pest) to develop intervention map and mitigation measures for the control of trans boundary pests • Stabilization of feed and other input products and prices in poultry value chain
Support for farming	• Develop and promote a	• Development and	

Immediate priority actions (ongoing to the end of 2023)	Short term priority actions (2023-2024)	Medium term actions (2024-2026)	Long term actions (2024-2027)
	- performance based agricultural extension system - Capacity building to strengthen the farm inputs regulatory functions to enable them play their regulatory role to checkmate the infiltration of adulterated farm inputs	- implementation of the National Farmers Soil Health Card Scheme to increase productivity - Development and promotion of cooperative models for impactful agricultural development	
Agricultural machinery		Accelerating the uptake of Minimum Viable Products from institutions and agencies in the agricultural mechanization and implements production space for full commercialization by the private sector investment	Promoting viable agricultural mechanization enterprises and services such as the tractor and equipment e-hailing hiring services at the State and Local Government levels to enhance tractorization.
Agricultural infrastructure	- Developing a new strategy for strengthening agricultural infrastructure and provision of support to new farm types - Promoting irrigation through preparation of a Joint Action Plan with the Federal Ministry of Water Resources		Unlocking the job creation potentials of cold chain systems by encouraging private sector participation in community cold chain enterprises
Finance	Fast-track the take-off and operations of the National Agricultural Development Fund	Using Fintech solutions to create wallets for all financial disbursements to deliver directly to the targeted end users.	
Digitalization	Promotion of project monitoring	Development of digital/ICT	Development of a national

Immediate priority actions (ongoing to the end of 2023)	Short term priority actions (2023-2024)	Medium term actions (2024-2026)	Long term actions (2024-2027)
	- through development of digital platform and of e-extension service - Promoting urban agriculture that is technology-enabled	- Mobile-based Agro-industry System and E-extension platforms through the establishment of the national centres - Development of comprehensive soil fertility mapping and soil information system	- agricultural database for planning and implementation of agriculture and food security programs and initiatives - Carry out technology/ICT enabled farms and farmers enumeration and mapping in collaboration with states, local governments and development partners
Planning/Institutional design	- Developing a standard framework and guide for 'Ease of Doing Agriculture and Food Security (EDAFS)' - Institutionalization in the Ministry and consolidation of Nigerian Food System Dashboard for informed quality planning, policy decision and information dissemination	- Conducting standard feasibility and viability studies for commodity board operations in Nigeria - Setting up world class accredited laboratories in Research Institutes to validate the quality of exports and certification before shipment. - Strengthening Commodity Exchange for agriculture in collaboration with the Federal Ministry of Industry, Trade and Investment	
Institutional reform	- Strengthening agriculture and food security institutions and repositioning them for the tasks ahead - Increase of productivity through reform of the National Agricultural Research System	Prioritized use of digital and DEFI solutions to reform Bank of Agriculture and Nigerian Agricultural Insurance Corporation	Reforming and remodeling the Federal Colleges of Agriculture (FCAs) and the Agricultural and Rural Management Training Institute (ARMTI) to focus on vocational skills development & management training for

Immediate priority actions (ongoing to the end of 2023)	Short term priority actions (2023-2024)	Medium term actions (2024-2026)	Long term actions (2024-2027)
	Establishing two new national gene bank facilities, each for crop and animal respectively		- agriculture and food security issues - Review of existing curriculum for all fields of agriculture in collaboration with the Federal Ministry of Education, National Universities Commission (NUC) National Board of Technical Education (NBTE) and the National Commission for Colleges of Education towards the production of future agricultural graduates that are prepared for the next generation of agriculture (Agriculture 4.0)¹⁰⁵
Research & Development			
			- Repositioning the Universities of Agriculture, Veterinary Medicines and Faculties of Agriculture and Veterinary Medicines to play key roles in our agricultural transformation through the development of practical approaches for production and mechanization; - Development of critical mass of agricultural breeders (crops, livestock, and fisheries) and other emerging knowledge areas in ICT for agriculture (smart agriculture) to strengthen

¹⁰⁵ An agricultural model that utilizes the Internet of Things (IoT) to make profits for all farmers (<https://grapevine-shinshu-nakano.com/what-is-agriculture-4-0/>)

Immediate priority actions (ongoing to the end of 2023)	Short term priority actions (2023-2024)	Medium term actions (2024-2026)	Long term actions (2024-2027)
			- agricultural production system - Providing support for acquiring advanced laboratories equipment to drive new One health approach ¹⁰⁶ for veterinary practices while ensuring collaboration with human health practitioners and researchers
Partner collaboration	- Agriculture and Food Security Stakeholders' analysis and mapping - Developing a National Framework for proper coordination and alignment of all ongoing and future development partners' projects to our national priorities - Developing a stakeholder Engagement and Communication Strategy for Agriculture and Food Security - Conducting a comprehensive review of all existing agricultural laws and legislation to fast-track necessary amendments and enactments to support farmers' welfare and private sector participation in agriculture and food security	Developing a new Intergovernmental partnership framework for the implementation of mutually beneficial agricultural projects between Federal, State and Local governments	Strengthening the Community of Practice (CoP) for knowledge exchange and sharing of experiences to promote innovation and best practices amongst Federal, State and Local Government officials

¹⁰⁶ The idea is that humans, animals, and the environment (ecosystems) surrounding them are interconnected, and that the parties involved in human and animal health and environmental conservation should build close relationships and work to solve cross-sectoral issues. (<https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/0000172990.html>)

Immediate priority actions (ongoing to the end of 2023)	Short term priority actions (2023-2024)	Medium term actions (2024-2026)	Long term actions (2024-2027)
	• Deepening engagement between farmers, herders, traditional institutions and communities to promote peaceful coexistence and conflict resolution • Promoting the establishment of Agribusiness Development Centres for youth and women • A call for application for agro innovation enterprise and venture development competition targeting Nigerian youths is being developed.		
Other		• Reviving and promoting home economics and food and nutrition knowledge transfers and practices at the State and Local Governments • Promotion and strengthening of Agro-Rangers to include other paramilitary to assist in solving the problems of civil insecurity at the farm level.	• Establishment of new agro tourism hubs where farms and national agricultural heritage can be made to create new wealth and jobs

Source: Created by the Survey team

2.4 Trends and cooperation analysis of other aid agencies and the possibility of collaboration with JICA projects

In this section, firstly, cooperation policies and the overall project of each aid agency in the Nigerian agricultural sector will be described, and then the possibility of collaboration with JICA projects will be described.

2.4.1 World Bank ¹⁰⁷

The World Bank's ongoing projects are outlined in the following table. The World Bank is addressing the challenges of cereal, vegetables, livestock and aquaculture among the five crop categories defined in “2.1.2 Analysis of value chain of major commodities”, as well as the agricultural production base, distribution base, and private investment. The types of behavioural changes ¹⁰⁸ induced by these interventions are also presented.

Table 2-78 World Bank: Ongoing Project in Nigeria

Project Name	Objectives	Target Crop	VC Target Actor	Target State	Behaviour Change Type
<u>Livestock Productivity and Resilience Support Project (to be completed in March 2028)</u>	To improve productivity, commercialization, and resilience of targeted livestock production systems in Nigeria.	Cows, Sheep, Goats, Chickens, Pigs, Bees	Administration Producer Processor Seller	36 states	Rural production system Agriculture and rural infrastructure Linkage with business firms Agricultural finance function
<u>NIGERIA: COVID-19 Action Recovery and Economic Stimulus Programme (to be completed in June 2024)</u>	To expand access to livelihood support and food security services, and grants for poor and vulnerable households and firms	N/A	Administration Producer Distributor Processor Seller	N/A	Rural production system Agriculture and rural infrastructure Linkage with business firms Agricultural finance function
<u>Ogun State Economic Transformation Project (to be completed in June 2025)</u>	To increase the participation of the private sector in the economy of Ogun State with a focus on improving the business-enabling environment,	Cassava, Maize, Rice, Soybean, Tomato, Fisheries, Poultry	Administration Producer Processor Seller	Ogun	Rural production system Linkage with business firms Agricultural finance function

¹⁰⁷ [https://projects.worldbank.org/en/projects-operations/projects-list?lang=en&countrycode_exact=NG&os=0&status_exact=Active^Pipeline&countryshortname_exact=Nigeria&sector_exact=\(Historic\)Agriculture%20adjustment^Agricultural%20Extension%2C%20Research%2C%20and%20Other%20Support%20Activities^Agricultural%20markets%2C%20commercialization%20and%20agri-business^Agro-industry^Crops^Fisheries^Forestry^Irrigation%20and%20Drainage^Livestock^Micro-%20and%20SME%20finance^Other%20Agriculture%2C%20Fishing%20and%20Forestry^Other%20Non-bank%20Financial%20Institutions^Public%20Administration%20-%20Agriculture%2C%20Fishing%20%26%20Forestry](https://projects.worldbank.org/en/projects-operations/projects-list?lang=en&countrycode_exact=NG&os=0&status_exact=Active^Pipeline&countryshortname_exact=Nigeria&sector_exact=(Historic)Agriculture%20adjustment^Agricultural%20Extension%2C%20Research%2C%20and%20Other%20Support%20Activities^Agricultural%20markets%2C%20commercialization%20and%20agri-business^Agro-industry^Crops^Fisheries^Forestry^Irrigation%20and%20Drainage^Livestock^Micro-%20and%20SME%20finance^Other%20Agriculture%2C%20Fishing%20and%20Forestry^Other%20Non-bank%20Financial%20Institutions^Public%20Administration%20-%20Agriculture%2C%20Fishing%20%26%20Forestry)
(Accessed: 29 Nov..2023)

¹⁰⁸ Behavioral change envisioned in the strategy map of “2.6 Cooperation Policy for the Nigerian Agricultural Sector.”

Project Name	Objectives	Target Crop	VC Target Actor	Target State	Behaviour Change Type
	strengthening agri-food value-chains and upgrading skills.	Farming			
<u>RAAMP Nigeria Rural Access and Agricultural Marketing Project (to be completed in June 2026)</u>	The proposed project objective is to improve rural access and agricultural marketing in participating states while strengthening the financing and institutional base for effective development, maintenance and management of the rural road network.	N/A	Administration Distributor Seller	Sokoto, Kebbi, Katsina, Kano, Bauchi, Plateau, Kwara, Kogi, Oyo, Ogun, Ondo, Abia, Akwa-Ibom	Rural production system Agricultural finance function
<u>Nigeria For Women Project (to be completed in March 2024)</u>	To support improved livelihoods for benefiting women in targeted areas of Nigeria.	N/A	Rural women	Abia, Kebbi, Niger, Ogun, Taraba,	Rural production system
<u>Agro-Processing, Productivity Enhancement and Livelihood Improvement Support Project (to be completed in September 2023)</u>	To enhance the agricultural productivity of small and medium-scale farmers and improve value addition along priority value chains in the Participating States	N/A	Producer Processor Distributor Seller	Cross River, Enugu, Kaduna, Ogi, Lagos	Rural production system Agriculture and rural infrastructure
<u>TRIMING Transforming Irrigation Management in Nigeria (to be completed in April 2024)</u>	To improve access to irrigation and drainage services and to strengthen institutional arrangements for integrated water resources management and agriculture service delivery in selected large-scale public schemes in Northern Nigeria.	Agricultural crops, Livestock, Fisheries in general	Producer Processor Distributor Seller	Zamfara, Sokoto, Jigawa	Rural production system Linkage with business firms
<u>[Scheduled] SPIN Sustainable Power and Irrigation in Nigeria¹⁰⁹</u>	To improve utilization of existing storage for irrigation and hydropower generation and strengthen institutional arrangements for integrated water	N/A	Producer	N/A	Rural production system Agriculture and rural infrastructure

¹⁰⁹ <https://projects.worldbank.org/en/projects-operations/project-detail/P179684> (Accessed : 27 July 2023)

Project Name	Objectives	Target Crop	VC Target Actor	Target State	Behaviour Change Type
<u>(Scheduled for approval in FY2025)</u>	resources management in Nigeria				

Source: Created by the Survey team

According to an interview with the World Bank, the World Bank prioritizes cattle, sheep, and goats in livestock production, and supports crops that meet the needs of farmers. Their view is that there is a great need for support for irrigation, farm roads, and crop storage facilities.

RAAMP is co-financing with AFD (Agence Française de Développement). A total of 53,730 km of local roads will be developed in 13 provinces, and 65 agricultural product distribution centers will be constructed. Rural road development is the responsibility of each state, but the state government does not seem to have a sufficient level of ability to formulate plans or implement projects. Therefore, when JICA cooperates in rural road development, it is necessary to understand the current state of the road network in the state, select routes for the project, etc., and hold repeated discussions with state stakeholders from the planning stage. Alternatively, if you are aiming for quick support, co-financing with existing RAAMP may be effective.

As for the irrigation project, the World Bank is currently preparing SPIN (Sustainable Power and Irrigation in Nigeria) following TRIMING. This will improve the use of existing reservoirs for irrigation and hydropower in Nigeria and strengthen institutional arrangements for integrated water resources management. The budget is US\$700 million, and the implementing agency is the Federal Ministry of Water Resources.

For World Bank loan projects, the World Bank first makes an agreement with the Federal Ministry of Finance, and then the Federal Ministry of Finance makes agreements with federal ministries or state governments before implementation. Since the fiscal situation varies from state to state, it is necessary to target states with borrowing capacity.

The World Bank advised that with regard to assistance, JICA should first implement a project in one state, even if it is a loan project, involving various stakeholders in the value chain or rice sector and create a success story that will be a model for other states and other aid agency.

One of the possible implications for JICA projects from the World Bank's experience and advice is that some states, depending on their borrowing circumstances, do not want to take loans more, so if the borrower of the loan project is a state government, it is necessary to confirm the intention of the state government in advance. Next, regarding the advice to start in one state, the states to which JICA-related personnel can travel are limited due to JICA's security measures. Therefore, it is conceivable to concentrate support in these states first. To establish JICA's presence by implementing hub projects in these states and building networks with state governments, private companies, various cooperatives, and exemplary farmers is another effective approach.

2.4.2 African Development Bank ¹¹⁰

The following table outlines the projects currently underway at the African Development Bank. The African Development Bank is addressing the challenges of cereals, vegetables, processing crops, and livestock among the five crop categories, as well as agricultural production bases, distribution bases, and private investment. The types of behavioural changes induced by these interventions are also presented.

Table 2-79 African Development Bank: Ongoing Project in Nigeria

Project Name	Loan/Technical Assistance Amount	Objectives	Target crop	VC Target Actor	Target State	Behaviour Change Type
ATASP-I Agricultural Transformation Agenda Support Programme – Phase I <u>(to be completed in June 2025)</u>	Loan Total project cost N 23,041.34 million	- Improvement of Food and Nutrition security. - Job Creation. - Enhancement of incomes and shared wealth of the Program beneficiaries on a sustainable basis through the Rice, Cassava Sorghum value chain. - Improvement of rural infrastructure.	Rice, Cassava, Sorghum	Producer Distributor Seller	Jigawa, Enugu, Niger, Kebbi, Kano, Anambra, Sokoto	Rural production system Agriculture and rural infrastructure
PS-PVCP Plateau State Potato Value Chain Support Project <u>(to be completed in December 2027)</u>	Loan Total project cost USD 13 million	The project's specific objective is to increase on a sustainable basis, the income of smallholder farmers and rural entrepreneurs that are engaged in the production, processing, storage and marketing of Potato.	Potato	Producer Processor Distributor Seller	Plateau	Rural production system Agriculture and rural infrastructure

¹¹⁰ <https://www.afdb.org/en/documents/nigeria-country-strategy-paper-2020-2024-mid-term-review-mtr-and-2022-country-portfolio-performance-review-cppr-report> (Accessed: 28 Jul.2023)

Project Name	Loan/Technical Assistance Amount	Objectives	Target crop	VC Target Actor	Target State	Behaviour Change Type
SAPZ I Nigeria – Special Agro-Industrial Processing Zones <u>(to be completed in December 2028)</u>	Loan Total project cost USD 538.05 million	The Program development objective is to support inclusive and sustainable agro-industrial development in Nigeria.	Target crops are different in each state: Beef, Tomato, Rice, Oilseed, Peanut, Dairy, Cassava, Poultry, Cacao, Maize, Soybean, Ginger, Sesame oil,	Producer Processor Distributor Seller	Imo, Cross River, Oyo, Kaduna, Kano, Kwara, Ogun, FCT	Rural production system Agriculture and rural infrastructure Linkage with business firms
SAPZ II Nigeria – Special Agro-Industrial Processing Zones II <u>(in preparation)</u>	Loan Project cost Around N 24,140 million /State	The Program development objective is to support inclusive and sustainable agro-industrial development in Nigeria.	Target crops are different in each state	Producer Processor Distributor Seller	12States (under selection)	Rural production system Agriculture and rural infrastructure Linkage with business firms

Source: Created by the Survey team

According to an interview with the AfDB, SAPZ has a large demand for funds, and IsDB and IFAD are cooperating in the financing, and JICA is also welcome to participate.

SAPZ I was approved within the AfDB in December 2021, but preparations were significantly delayed due to COVID-19 and the change in government, and it is only recently that the prospect of implementation has been made. The progress of preparations and the timing of loan agreements are different for each target state, and since the project commencement has just started JICA's participation in additional financing and technical assistance, even though from the middle, is welcomed. In addition, it is possible to create synergistic effects in TSL and irrigation projects in collaboration with SAPZ.

Regarding SAPZ II, feasibility studies are currently being conducted in 18 states, and the bank approval is scheduled for 2024. IFAD, IsDB, ABEDA (Arab Bank for Economic Development in Africa) have expressed their intention to participate and AfDB welcomes JICA's participation in SAPZ II as well. Regarding JICA's role, AfDB did not have particular expectations for any sector, but they wanted to leverage each other's strengths in production, collection, seeds, irrigation, mechanization, processing, etc. Additionally, since SAPZ involves many Federal Ministries such as the Federal Ministry of Industry, Trade and Investment, the Federal Ministry of Water Resources, and the Federal Ministry of Power, the President of Nigeria is said he is seeking to establish a National SAPZ Office under the Office of the Vice President to coordinate the Ministries.

As a lesson of SAPZ I cited by the African Development Bank, initially it was assumed that the project would start at the same time in all states, but with the impact of COVID-19 and depending on the circumstances of each state, feasibility study, loan application, loan approval, implementation start, etc. could not start at the same time. Consequently, in SAPZ II, it was decided to start projects sequentially from the provinces where preparations were completed. Therefore, when JICA participates in SAPZ, it is necessary to follow up closely from the time of loan procedures so that the implementation of SAPZ can be smoothly started in the responsible province.

2.4.3 FAO¹¹¹

The following table outlines a project currently underway at the FAO. FAO is addressing a challenge related to the agricultural production base. The types of behavioural changes induced by these interventions are also presented.

Table 2-80 FAO: Ongoing Project in Nigeria

Project Name	Loan/Technical Assistance Amount	Objectives	Target Crop	VC Target Actor	Target State	Behaviour Change Type
TCP/NIR/3905 ¹¹² Digital Village Initiative to combat hunger, poverty, and inequality in Nigeria (2023-2025)	Technical Assistance Total project cost USD 416,000	A corporate programme aiming to combat hunger, poverty and inequality by fostering digital rural transformation. This is being carried out through the establishment of, or support to 1 000 smart rural villages supplied with the digital services needed for agrifood systems and rural transformation to achieve the Sustainable Development Goals (SDGs).	N/A	Producer Processor Distributor Seller	N/A	Rural production system Agriculture and rural infrastructure Linkage with business firms Agricultural finance function

¹¹¹ <https://www.fao.org/nigeria/programmes-and-projects/project-list/en/> (Accessed: 28Jul.2023)

¹¹² <https://www.fao.org/documents/card/en/c/CC6131EN> (Accessed: 27 Jul.2023)

Project Name	Loan/Technical Assistance Amount	Objectives	Target Crop	VC Target Actor	Target State	Behaviour Change Type
TCP/NIR/3904 Technical Support for feasibility and value chain analysis of Lagos State cattle feedlot farm estate (2022-2023)	Technical Assistance	As part of efforts to ensure sustainable beef production for the expanding population in the state, the Lagos state government, in collaboration with the Food and Agriculture Organization of the United Nations (FAO), is establishing a cattle feedlot farm estate.	Cattle	Producer Processor Distributor Seller	Lagos	Rural production system Agriculture and rural infrastructure Linkage with business firms
TCP/NIR/3803 UTF/NIR/072/NIR Technical Assistance for the Promotion of Drip Irrigation System at Selected Irrigation Schemes in Nigeria (2021-2023)	Technical Assistance Total project cost USD 350,000	Provide the opportunity to bring more land under cultivation utilizing existing irrigation facilities	N/A	Producer		Rural production system Agriculture and rural infrastructure

Source: Created by the Survey team

According to interviews with FAO, Nigeria's water resource development has historically centered on large-scale projects funded by international development agencies, primarily designed for flood control, hydropower and urban water supply, and irrigation was a secondary use. While the Federal Ministry of Water Resources focused on such large-scale infrastructure projects, the Federal Ministry of Agriculture had limited involvement in irrigation development. In order for irrigation facilities to contribute to agriculture, inter-ministerial cooperation is important, and the Federal Ministry of Water Resources and the Federal Ministry of Agriculture need a forum to discuss irrigation. In addition, 70% of large-scale irrigation facilities invested in the 1970s and 1980s are deteriorated. These large-scale irrigation systems are based on flood irrigation systems, but suffer from problems such as not providing the exact amount of water needed by crops, inadequate water conservation methods, and the inability of individual farmer groups to manage their irrigation systems. FAO has therefore initiated a new model of a groundwater irrigation system led by farmers' groups as a small-scale irrigation facility. Small-scale irrigation facilities are basically owned and operated at the individual level, so ownership is high, the initial investment is small, and operating costs for solar pumps, etc. are kept low. It is said that the applicable area is wide in Nigeria where groundwater resources are abundant. (However, FAO currently

has no solar pump projects in Nigeria.)

Regarding the Digital Village Initiatives¹¹³, currently in Nigeria, the ratio of extension staff to farmers is 1 out of 11,000 farmers, and the number of extension staff to farmers is very small. Therefore, digitization plays an important role in addressing the workforce shortage in extension activities. FAO recognizes the importance of working with private companies and other partners to achieve the Digital Village Initiative, including improving access to markets and the storage ecosystem in general.

As for JICA projects, it was advised to focus on provinces where JICA's presence is recognized and where other aid agencies are also supporting.

Implications and lessons for JICA projects that can be inducted from FAO's experience and advice are that The Federal Ministry of Agriculture has not been very involved in irrigation projects so far, but if JICA implements an irrigation project in the future, it will be effective to involve the Federal Ministry of Agriculture in order to increase the effectiveness of irrigation. However, it is necessary to proceed cautiously considering the demarcation with the Federal Ministry of Water Resources and historical circumstances.

Regarding the Drip Irrigation project, we can get implications for future JICA irrigation projects regarding the involvement of women in water users' associations and cooperation with the Federal Ministry of Agriculture regarding irrigation projects which remained as a lessons and challenges of the project¹¹⁴.

2.4.4 IFAD^{115, 116}

IFAD's ongoing projects are outlined in the following table. IFAD is addressing the challenges of cereal, vegetables, processing crops, livestock and aquaculture among the five crop categories, as well as the agricultural production base, distribution base, and private investment. The types of behavioural changes induced by these interventions are also presented.

Table 2-81 IFAD: Ongoing Project in Nigeria

Project Name	Loan/Technical Assistance Amount	Objectives	Target Crop	VC Target Actor	Target State	Behaviour Change Type
SAPZ I Special Agro-Industrial Processing Zones Programme (to be completed in December 2028)	Loan Loan amount USD 538.05 million (Co-financing with AfDB)	- Supporting the development of SAPZs in high food production areas to supply the domestic food market and create exportable surpluses (AfDB-led); - Empowering smallholders and	Planned to select two from the following agricultural product value chains with high potential and focus on them.	Producer Processor Distributor Seller Rural Women & Youth	Kano, Kaduna, Oyo, Kwara, Ogun, Imo, Cross River	Rural production system Agriculture and rural infrastructure Linkage with business firms Agricultural finance

¹¹³ <https://www.fao.org/platforms/digital-village-initiative/en> (Accessed: 28 Jul.2023)

¹¹⁴ P.25, para 86 and P.27, para.95 in "Evaluation of FAO's contribution to Nigeria, 2016-2022" June 2023, FAO

¹¹⁵ <https://www.ifad.org/en/web/operations/w/country/nigeria> (Accessed: 18 Apr.2023)

¹¹⁶ https://www.ifad.org/en/web/operations/w/country/nigeria#anchor-projects_and_programmes (Accessed: 18 Apr.2023)

Project Name	Loan/Technical Assistance Amount	Objectives	Target Crop	VC Target Actor	Target State	Behaviour Change Type
		small operators, including women and youth, to take advantage of the markets created by the SAPZs to sustainably enhance their income and access to employment, household food security and nutrition, and resilience to climate change (IFAD-led)	Cassava, Rice, Poultry, Fishery, Rice, Tomato, Groundnut, Sesame			function
LIFE ND Livelihood Improvement Family Enterprises Project in the Niger Delta of Nigeria (to be completed in March 2025)	Loan Total project cost USD 100.02 million (IFAD loan amount USD 60 million)	To enhance income, food security and job creation for rural youth and women, through sustainable agribusiness development in Nigeria's Niger Delta region. This project builds on the success of previous IFAD-supported projects to develop a skilled youth workforce supply, and aims to strengthen the capacity of state and community-level institutions to collaborate with the private sector.	Cacao, Plantain, Palm oil, Cassava, Fish, Palm fruit	Rural Women & Youth	Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, Rivers	Rural production system Linkage with business firms Agricultural finance function
IFAD-VCDP Value Chain Development Programme (to be completed in December 2024)	Loan Total project cost USD 330.52 million (IFAD loan amount USD 213.95 million)	To increase, on a sustainable basis, the incomes and food security of poor rural households engaged in the production, processing and marketing of rice and cassava in the targeted LGAs' smallholder production.	Cassava, Rice	Producer Processor Seller	Anambra, Benue, Ebonyi, Taraba, Niger, Ogun, Kogi, Nasarawa, Enugu	Rural production system Linkage with business firms Agricultural finance function

Project Name	Loan/Technical Assistance Amount	Objectives	Target Crop	VC Target Actor	Target State	Behaviour Change Type
		The target group includes 15,000 smallholder farmers, 1,680 processors and 800 traders.				

Source: Created by the Survey team

According to an interview with IFAD, IFAD is implementing SAPZ I with AfDB, and it is possible to collaborate with JICA.

In LIFE ND, the method of selecting targets to be supported is determined by the comparative advantage of crops, the benefits to farmers' income, the state's vision for priority crops, consistency with the objectives of IFAD, and the efficiency of project implementation. Furthermore, IFAD also considers the advantages of each state in the market (proximity to cities, the possibility of being a stopover point, etc.). The project will involve 25,500 young people and women and 600 existing and potential business incubators, with beneficiaries aged between 18 and 35 and female heads of households with children under 15. The project as a whole aims to have a 50% female participation rate.¹¹⁷

IFAD-VCDP develops value chain linkages between producers, processors and related companies. IFAD-VCDP has developed contract farming between producers and processors to prevent side sales. In addition, a price committee has been set up under the Commodity Alliance Forum (CAF), which was established for cooperation between farmers and companies, and member farmers of the committee survey market prices every two weeks.

Additionally, VCDP collaborated with GIZ's Agfin to develop a standardized training module on financial literacy and was responsible for training facilitators on this across all target provinces. It also collaborated with GIZ to conduct market research on cassava value chain financing in Ogun State.¹¹⁸

IFAD has also developed the Gender Action Learning System (GALS) and has adopted it in every IFAD project. We welcome the use of GALS in JICA projects. However, it is not easy to involve women in the project, especially in the northern region where there are very conservative communities.

- Interview about IFAD-VCDP at Nasarawa State Ministry of Agriculture

IFAD-VCDP is being implemented in five LGs (Lafia, Doma, Nasarawa, Wamba and Karu) targeting 7,000 rice and cassava farmers. Some of the cost of seeds and inputs is subsidized. (Farmer's burden: 30% in the 1st year ⇒ 70% in the 3rd year). In addition, linkages were created between farmers and off-takers (companies, medium-scale processors, etc.), and farmers and off-takers entered into the annual contract farming. As a result, rice yield increased from 2 ton/ha to 4.5 ton/ha. After completion of IFAD/VCDP, activities will continue under CAF.

¹¹⁷ <https://www.ifad.org/en/web/operations/-/project/2000001043> (Accessed : 28 November 2023)

¹¹⁸ "Value Chain Development Programme Mid-term Review", IFAD, 27/01/2023 (Accessed : 27 July 2023)

As implications and lessons for JICA projects that can be inducted from IFAD's experience, the activities of the price committee under CAF in the VCDP can serve as a reference in fostering the ownership of farmers to improve their own livelihoods. In addition, the creation of linkages between farmers, companies, processors, etc., contract farming, and partnerships with AgFin will serve as a reference when formulating value chain project in the future. Further, GALS, which is applied in all IFAD projects, can serve as a reference for gender mainstreaming in JICA projects.

2.4.5 USAID¹¹⁹

USAID's ongoing program is outlined in the following table. USAID is addressing the challenges of cereal, vegetables, livestock and aquaculture among the five crop categories, as well as the agricultural production base, distribution base, and private investment. The types of behavioural changes induced by these interventions are also presented.

Table 2-82 USAID: Ongoing Project in Nigeria

Project Name	Loan/Technical Assistance Amount	Objectives	Target Crop	VC Target Actor	Target State	Behaviour Change Type
Feed the Future Initiative (to be completed 2024-10-27)	Technical assistance Total project cost USD 25million	- Increasing the Productivity, and Competitiveness of Selected Value Chains and Market Systems - Enhancing the Capacities of Vulnerable Households and Communities to Respond to Shocks and Stresses - Improving Access to and Use of Diverse, Safe, Nutritious, and High Quality Foods - Advancing Country Leadership Through Strengthening of Selected Policy Systems	Fish Cowpeas Rice Soybeans Maize Sheep Goat	Producer Distributor Seller	Focus: Niger, Kaduna, Benue, Ebony, Delta, Cross River, Kebbi	Rural production system Linkage with business firms Agricultural finance function
Power Africa - Nigeria Power Sector Programme		- Productive use of solar irrigation systems for	N/A	Producer	N/A	Rural production system

¹¹⁹ <https://www.usaid.gov/nigeria/agriculture-and-food-security> (Accessed: 28 Jul.2023)

Project Name	Loan/Technical Assistance Amount	Objectives	Target Crop	VC Target Actor	Target State	Behaviour Change Type
		smallholder farmers				

Source: Created by the Survey team

Although we were unable to contact USAID, the World Bank provided USAID's survey report as a reference for the SPIN project being prepared.¹²⁰ This report considers the introduction of solar cells to power irrigation pumps used by small farmers. In collaboration with USAID, TSL, which envisions farmers groups, suppliers of irrigation pumps and solar cells, small-scale power transmission and distribution companies as borrowers, and Grant Aid for equipment procurement to farmers' groups can be considered.

2.4.6 GIZ¹²¹

GIZ's ongoing program is outlined in the following table. GIZ is addressing the challenges of cereal and processing crops among the five crop categories and the agricultural production base, distribution base, and private investment. The types of behavioural changes induced by these interventions are also presented.

Table 2-83 GIZ: Ongoing Project in Nigeria

Project Name	Loan/Technical Assistance Amount	Objectives	Target Crop	VC Target Actor	Target State	Behaviour Change Type
MOVE Market-Oriented Value Chains for Jobs & Growth in the ECOWAS Region (2022-2024)	Technical assistance	Improved income and employment prospects have been created in the ECOWAS region along market-oriented and resilient value chains (rice and cashew).	Rice, Cashew nuts	Producer Distributor Seller	N/A	Rural production system
AgFIN Promotion of agricultural finance for agri-based enterprises in rural areas (to be completed in March 2026)	Technical assistance Total project cost EUR 8.7 million	The provision of financial services to agricultural and agri-based enterprises in rural areas that are tailored to their business models has improved.	Rice, Maize, Potato, Cassava	Producer Distributor Seller	Benue, Cross River, FCT, Kaduna, Kano, Kebbi, Nasarawa, Ogun, Osun, Oyo, Plateau	Linkage with business firms Agricultural finance function

¹²⁰ "Power Africa Nigeria Power Sector Program, Productive Use Solar Irrigation Systems in Nigeria", 31 March 2022, USAID/Southern Africa

¹²¹ <https://www.giz.de/en/worldwide/1902.html> (Accessed: 18 Apr.2023)

GIAE - Nigeria Green Innovation Centres for the Agriculture and Food Sector Programme (to be completed in September 2024)	Technical assistance Total project cost EUR 40.15 million	The goal is to support rice, maize, cassava and potato smallholder farmers in Nigeria to increase income and enhance productivity through job creation and improved access to education and training programmes and information services.	Rice, Cassava, Potato, Maize	Producer Processor	Benue, Nasarawa, Kaduna, Kano, Ogun, Oyo, Plateau, Cross River	Rural production system Linkage with business firms Agricultural finance function

Source: Created by the Survey team

According to an interview with GIZ, AgFIN operates in the same province as GIAE. Mainly for women and young farmers, GIZ conducts Business Model Analysis (BMA) to support the creation of profitable projects (mainly aimed at increasing yields), financed by PFI. Initially, PFI was supposed to be the commercial bank, but the commercial banks were not interested in small loans, so it was changed to MFBs. PFIs were invited to submit expressions of interest through the Association of MFBs. Difficulties and lessons learned include building a business model that is compatible with high interest rates in Nigeria, lack of farming data, and fluctuations in market prices. In addition, as mentioned in the IFAD section above, in collaboration with IFAD, GIZ is developing training modules on financial literacy at VCDP, training facilitators, and conducting market research on value chain financing.

As implications and lessons for JICA projects from Agfin's experience are that when lending to small farmers in the framework of TSL, considering MFB instead of commercial banks as PFI, and regarding the construction of business models and the lack of farming data, cooperating with FMARD's FDA and NIRSAL, etc. and to respond to market price fluctuations, it is necessary to obtain early and accurate price information and to build a system that can respond flexibly. In this regard, the activities of the price committee under CAF, mentioned in the above IFAD-VCDP, can be used as a reference.

2.4.7 AFD¹²²

According to interviews with AFD, AFD is coordinating with the World Bank to finance RAAMP and has just disbursed funds to four states in the first lot. The project aims to firstly build roads and an agricultural logistics center, and secondly connect them to the domestic markets. In addition, agricultural vocational training pilot projects are underway (Oyo, Plateau and Benue states), and a feasibility study for value chain support in the northwest region is underway.

According to AFD, it already has an MOU with JICA, so it would like to realize collaboration such as project implementation.

¹²² <https://www.afd.fr/en/page-region-pays/nigeria> (Accessed : 10 Dec. 2023)

2.4.8 Responses of each aid agency to each challenge

The following table summarizes the challenges that each agency is working on from the above ongoing projects.

Table 2-84 Challenges Targeted by aid agencies

Aid Agencies	Categories by Five Crops					Agricultural Production Base	Distribution Base	Private Investment
	Cereals	Vegetables	Processing Crops	Livestock	Aquaculture			
World Bank	○	○		○	○	○	○	○
African Development Bank	○	○	○	○		○	○	○
FAO						○		
IFAD		○	○	○	○	○	○	○
USAID	○	○		○	○	○	○	○
GIZ	○		○			○	○	○
AFD						○		

Source: Created by the Survey team

Summarizing the support provided by each agency, all of the challenges related to five crop categories, agricultural production bases, distribution bases, and private investment have been addressed.

2.4.9 Possibility of cooperation with JICA

Based on the above survey results, the status of collaboration between each project/program and each aid agency is summarized in the table below.

Table 2-85 Status of collaboration between each project/program and each aid agency

◎: Lead Agency

○: Collaborating Agency

Program/Project	WB	AfDB	IsDB	IFAD	FAO	USAID	GIZ	AFD
SPIN	◎							
RAAMP	◎							○
SAPZ I		◎	○	○				
SAPZ II		◎	○	○				
ATASP-I		◎						
Digital Village Initiative					◎			
Drip Irrigation					◎			
LIFE ND				◎				
IFAD-VCDP				◎			○	
Power Africa - Nigeria Power Sector Program						◎		
AgFin							◎	
GIAE							◎	

Source: Created by the Survey team

The table below shows the possibility of collaboration with JICA for each project/program in the table above.

Table 2-86 Possibility of collaboration between each project/program and JICA

Program/ Project	Lead Agency	Possibility of collaboration with JICA
SPIN	WB	Co-financing for irrigation facility development, or technical support for irrigation facility management and strengthening of water users' associations can be considered.
RAAMP	WB	This project is a project to improve local roads and build agricultural product distribution centers. Therefore, it is conceivable to cooperate to achieve synergistic effects through co-financing or assistance related to agricultural infrastructure projects (irrigation facilities, storage facilities, processing facilities, etc.) and the development of market price information within the project area.
SAPZ I	AfDB	Participation as an additional financing agency or technical assistance is possible, even though from the middle. Also, outside the SAPZ framework, but in nearby areas, cooperation to achieve synergistic effects in TSL and agricultural infrastructure projects (irrigation facilities, storage facilities, processing facilities, farm roads, etc.) is conceivable.
SAPZ II	AfDB	AfDB internal approval is scheduled for 2024, and preparations such as F/S are currently underway. SAPZ has a large demand for funds, and participation as a co-financing institution is conceivable. Or, same as SAPZ I, outside the SAPZ framework, cooperation to achieve synergistic effects in TSL and agricultural infrastructure projects (irrigation facilities, storage facilities, processing facilities, farm roads, etc.) is conceivable.
ATASP-I	AfDB	Since this project aims to increase the income of beneficiaries by improving the value chain of target crops and rural infrastructure, parallel support such as the dissemination of the SHEP method and technical support for irrigation facility management, etc. can be considered for cooperation to achieve synergistic effects.
Digital Village Initiative	FAO	It is conceivable to provide parallel support for revitalizing extension services, such as support for the utilization of external digital resources and maintenance of price information.
Drip Irrigation	FAO	The project was completed in December 2022. Lessons learned and issues remained in the project that are involvement of women in water users' associations and cooperation with the FMARD ¹²³ can provide suggestions for future JICA irrigation projects.
LIFE ND	IFAD	This project targets young people and women who are deprived of livelihoods in rural areas. Parallel support, such as vocational training such as farm road construction for young people, household account book training and kitchen gardening training for women, and nutrition training for extension workers, can be considered for cooperation to achieve synergistic effects.
IFAD-VCDP	IFAD	This project is scheduled to be completed in December 2024, but even after completion, the activities will continue under CAF, so support for organizational strengthening and continuation of CAF is conceivable. In addition, in cooperation with CAF's activities, it is conceivable to cooperate to create synergistic effects through parallel support such as expansion and facilitation of access to market price information. It is also possible to cooperate in formulating a model contract for contract farming.
Power Africa – Nigeria Power Sector Programme	USAID	With regard to the introduction of irrigation pumps powered by solar cells, TSL that assumes farmer groups, suppliers of irrigation pumps and solar cells and power transmission and distribution companies as borrowers, or procurement of equipment to farmer groups, collaboration can be considered. It is also possible to cooperate in technical training for the introduction of solar battery irrigation pumps for farmers' groups.

¹²³ P.25, para 86 and P.27, para.95 in “Evaluation of FAO’s contribution to Nigeria, 2016-2022” June 2023, FAO

Program/ Project	Lead Agency	Possibility of collaboration with JICA
AgFin	GIZ	Parallel support such as training on agribusiness for beneficiaries (mainly young people and women), training for PFIs, formulation of model cultivation contracts, formulation of business linkages, etc., can be considered for cooperation to achieve synergistic effects.
GIAE	GIZ	In addition, to support similar to AgFin, cooperation that produces synergistic effects such as agricultural training for beneficiaries (mainly young people and women) and dissemination of SHEP methods is conceivable.

Source: Created by the Survey team

Regarding collaboration with each aid agency's project, participation in SAPZ I and SAPZ II is considered to be a priority for co-financing.

However, although AfDB is the leading donor, it is necessary to devise ways to draw attention to JICA's contribution. As SAPZ implementation states are assigned to each financing institution, it is desirable for JICA to be in charge of a state where JICA can travel in terms of safety management and where JICA's presence is already recognized through SHEP projects, etc.

Other possibilities include co-financing with SPIN for irrigation facility development and RAAMP for rural road development and agricultural product distribution center construction.

FAO's Drip Irrigation project has already been completed, but the lessons and issues of the project will be useful for JICA's future irrigation projects, so it is desirable to cooperate with FAO in sharing knowledge.

Regarding USAID's Power Africa - Nigeria Power Sector Programme, although the progress of the project to extent solar pumps for irrigation is unknown, but the report was provided by the World Bank, and the solar pump was mentioned in an interview with FAO. Therefore, it can be considered that there is a possibility of a project implemented by one of the aid agencies. In addition, when considering solar pumps for irrigation projects that JICA will implement in the future, it is possible to cooperate with this USAID program by sharing knowledge.

Regarding other programs/projects, considering the contents and implementation period, it is considered realistic to not participate in the programs/projects, but to collaborate as side support to create synergistic effects. All of them can utilize JICA's knowledge, experience and technology, such as agricultural infrastructure projects, water user association strengthening, DX, community development, agribusiness, and SHEP.

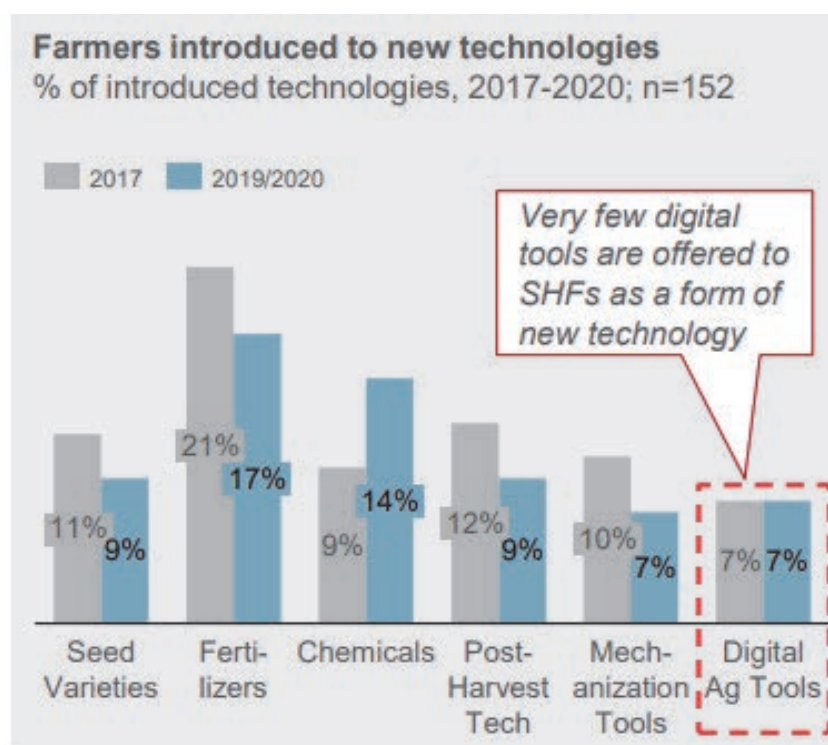
2.5 Digital Technology Applications and Startups in Agricultural Value Chain

2.5.1 Status of Digital Technology Application in Agricultural Value Chain

(1) Lagging agricultural VC digitization

According to the ITU study, Nigeria's telecommunications coverage in 2022 is 94% of the population, while 4G mobile penetration is 81%. As for internet, the results are from 2017, but only 2% in rural areas compared to 18% in urban areas. Due in part to this lack of infrastructure, the use of digital in the agricultural sector is lagging.

The "Ecosystem Study of the Digital Agricultural Landscape in Nigeria" (2021) by Mercy Corp Agrifin found that 68% of small farmers own a phone, but only 26% own a smartphone. The study also found that while 68% of smallholder farmers own a phone, only 26% own a smartphone, and only 7% of smallholder farmers have experience using digital solutions. Excluding fertilizers and pesticides, mechanization and other services are also less than 10%. The report points out that the delay in the use of digital technology by small-scale farmers is due to the fact that small-scale farmers have little opportunity to be introduced to digital solutions using new technologies due to their access to the Internet and literacy issues.



Source: MercyCorp Agrifin, Ecosystem Study of the Digital Agricultural Landscape in Nigeria, 2021

Figure 2-57 Percentage of small farmers introduced to new technology

(2) Digital Agriculture Strategy by the Government

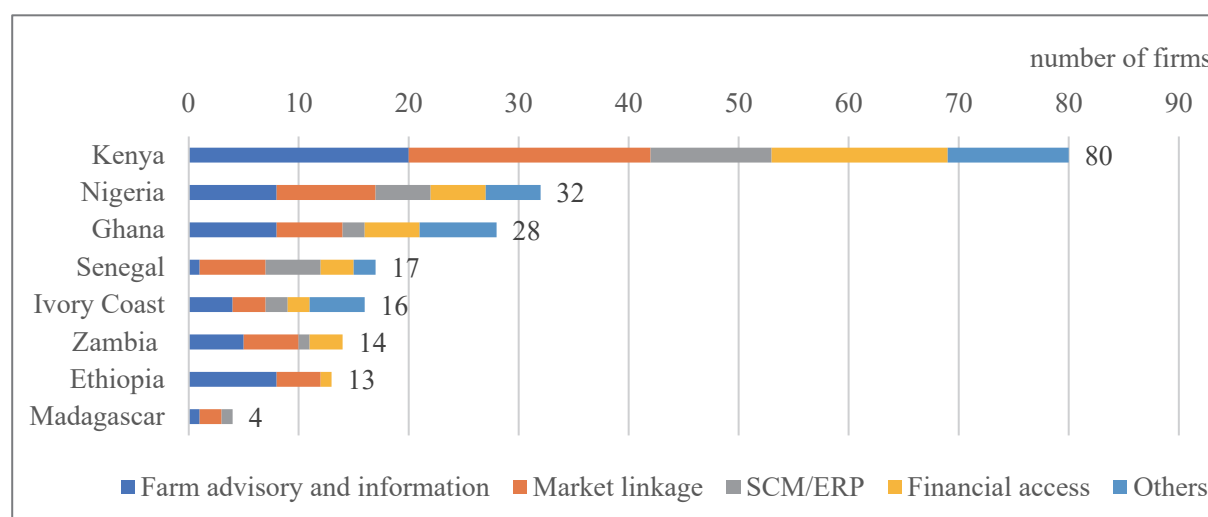
In this context, it is increasingly recognized that the use of digital technology is essential to improve

agricultural productivity, and the National Information Technology Development Agency (NITDA) of the Federal Government has developed the "Nigeria Digital Agriculture Strategy (2020-2030)". The federal government has developed the "NIGERIA DIGITAL AGRICULTURE STRATEGY (2020-2030)," which aims to "make Nigeria one of Africa's top three food secure countries and top 20 agricultural exporters by 2030 through the use of digital technology and innovation. Nigeria will become one of Africa's top 3 food security countries and top 20 agricultural exporters by 2030 through the use of digital technology and innovation. FMAFS (FMARD at the time of formulation), in collaboration with ICT policy implementing agencies, has also formulated a five-year plan, NATIP, for the use of ICT in the agricultural sector, and is working on the use of ICT technology, including the introduction of the use of e-vouchers for agricultural input support to small farmers.

However, as discussed below, the federal and state governments are still in the early stages of digitization efforts. In relation to this situation, CTA's THE DIGITALISATION OF AFRICAN AGRICULTURE REPORT points out that the progress of digitalization is mainly in private projects targeting relatively large farmers and farmers in urban and suburban areas¹²⁴.

(3) Initiatives by the private sector

As for initiatives by the private sector, the "Survey on Information Collection and Verification of Agricultural Digitalization Platforms in Africa" (2021, JICA) found that Nigeria ranks second after Kenya with 32 platforms (as of 2021), based on a total of 204 platforms deployed in eight African countries including Nigeria. The survey reported that Nigeria has the second largest number of digitalization platforms in Africa (as of 2021), after Kenya, with a well-balanced coverage by function: farmer support and information services, market linkages, farm management, finance and payments, and others (e.g., farm machinery rental).



Source: Information Gathering and Confirmation Survey on the Construction of Agricultural

Figure 2-58 Functional Development of Agricultural Digital Services

¹²⁴ Report of CTA (Technical Centre for Agricultural and Rural Cooperation)

In addition, digitalization of the agricultural sector is being undertaken by many startups, and according to TRACXN's Agri-Tech startup survey data published in 2022-2023, 23 startups are reported to be located in Abuja and 48 in Lagos¹²⁵, which are the most populous and agriculturally significant countries in Africa. This suggests that many startups are focusing on the Nigerian market, which is one of the most populous and agricultural countries in Africa. However, some of the startups introduced in the report cannot be confirmed on the website, suggesting that the metabolism of the startups in Nigeria is intense.

The rapid metabolism can be seen in the case of cellulant, which had been a pioneer in agricultural value chain reform through the provision of a blockchain-based platform called Agrikore, and had achieved a good track record in the field, but was forced to dismiss 14 employees due to misconduct and the resignation of its co-owner, Bolaji Akinboro. The company's withdrawal from the agricultural business can also be seen from the fact that cellulant, which had been leading the way in agricultural value chain reform through the provision of an agricultural value chain reform platform and had a proven track record. Bolaji Akinboro, who resigned from cellulant, has already settled with cellulant, launched ToroNet as a new agricultural value chain startup, and is promoting AgriFI, a blockchain-based platform with the support of USAID and other organizations. and the business of agrarian reform itself is considered to be dependent on key players.

Due to the severe risk environment, startups often face difficulties in raising funds; according to the PERTECH "2022 AFRICA TECH VENTURE CAPITAL" report, Nigeria is the largest investment destination of venture capital (VC) in Africa with about \$1.2 billion. However, investment in the agri-tech sector in Nigeria remains extremely small, at \$2.8 million (0.2%), compared to \$57.5 million (7.6%) in Kenya, \$12.3 million (1.5%) in South Africa, and \$9.1 million (4.5%) in Ghana, among other countries. The small amount of investment in the agri-tech sector in Nigeria and the difficulty for agri-tech companies to raise funds is due to the perceived high risk of the agri-tech sector, and the GSMA "AgriTech in Nigeria" (2020) states that "Domestic investment after the pre-seed phase The GSMA "AgriTech in Nigeria" (2020) cites "lack of money," "difficulty in accessing investment capital from institutional investors," and "lack of large investments.

While there is a need for start-up support in terms of industry promotion, it can be inferred that agri-tech companies' efforts are not stable due to the severe risk assessment of the agricultural sector.

¹²⁵ More than 80 startups exist according to GSMA.

Table 2-87 VC Investment in Africa (2022)

PRIMARY MARKET	NIGERIA	EGYPT	KENYA	SOUTH AFRICA	GHANA	MOROCCO	SENEGAL	UGANDA	OTHER	TOTAL
FINTECH	798.2	261.6	94.8	387.7	115.0	2.5	94.0	33.1	133.6	1,920.4
CLEANTECH	17.4	19.5	234.5	152.1	10.7	-	-	-	428.5	862.7
E/M/S/COMMERCE	96.9	204.0	266.7	20.0	0.3	14.1	0.9	1.3	33.4	637.6
ENTERPRISE	48.0	128.5	28.7	147.2	12.1	6.4	2.5	6.8	169.2	549.3
MOBILITY	-	9.0	11.9	-	-	-	1.0	-	173.4	195.3
HEALTHTECH	41.3	53.9	9.8	10.1	50.8	0.5	-	5.0	9.9	181.3
LOGISTICTECH	71.4	55.6	17.6	3.4	4.2	1.7	5.3	-	17.3	176.6
EDTECH	10.1	46.6	4.8	9.1	-	-	-	1.4	24.6	96.5
CONNECTIVITY	-	-	28.0	59.9	-	-	-	-	-	87.9
AGRITECH	2.8	-	57.5	12.3	9.1	1.3	0.9	0.3	2.3	86.4
INSURTECH	47.6	1.2	3.7	3.7	-	-	-	-	3.0	59.2
ENTERTAINMENT	10.2	4.7	-	22.7	-	-	0.8	-	3.7	42.1
HW & ELECTRONICS	10.0	2.2	-	1.5	-	-	-	-	3.4	17.1
	1,153.8	786.8	758.1	829.6	202.1	26.4	105.3	47.9	1,002.3	4,912.3

Source: PERTECH, 2022 AFRICA TECH VENTURE CAPITAL

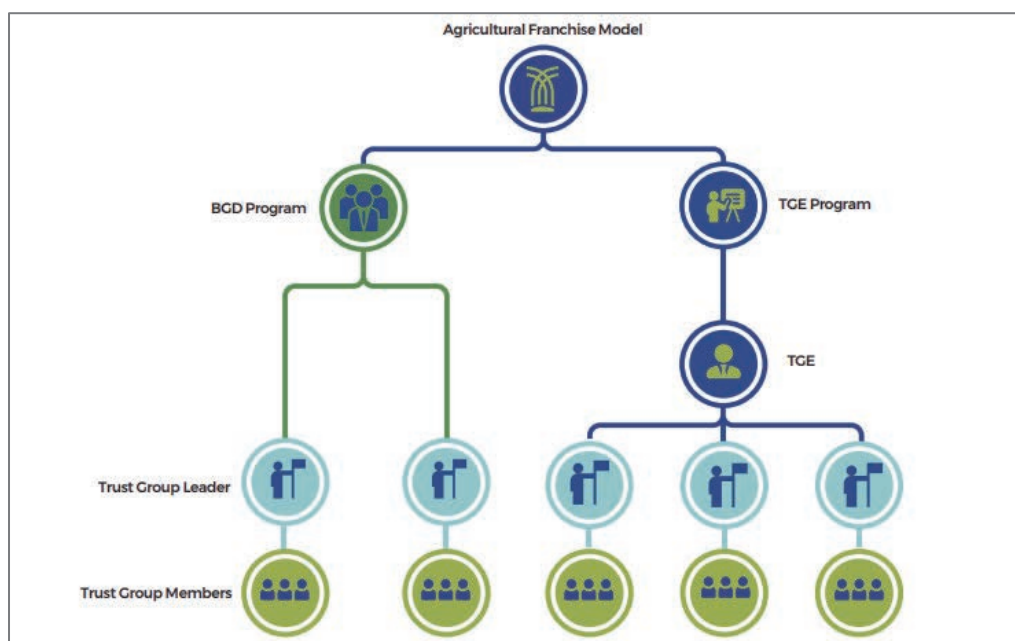
2.5.2 Startups and Other Initiatives in the Agricultural VC | Organizer

(1) Business models of startups and organizers in the agricultural value chain

One of the challenges in promoting agriculture in Nigeria is said to be the lack of organization among farmers due to a lack of social mutual trust. Companies with an awareness of social issues, including startups that aim to utilize digital technology, are addressing this issue. The common feature of many of these initiatives is that the core organizer companies use local agents to organize and empower farmers, and then provide the services necessary for production in collaboration with specialized institutions such as manufacturers of seeds, fertilizers, and other materials, off-takers such as food manufacturers, and financial institutions. The participating institutions provide the necessary services to the farmers.

Participating institutions contribute to the improvement of farmers' income and gain profit-earning opportunities in the process of achieving a higher level of productivity for the supported farmers. Material manufacturers, financial institutions, and others secure revenue for their services, while the organizers receive commission income for their services, creating a sustainable ecosystem as a whole.

For example, Babban Gona, established in 2012, has been working to organize farmers and make them self-reliant through an agricultural production franchise model, organizing farmers into "Trust Groups" and increasing the productive capacity of these organizations, Babban Gona has been working to organize farmers into "Trust Groups" and to increase the productive capacity of these organizations, Babban Gona has been working with donors, financial institutions, agribusinesses, and off-takers to provide "Training & Education", "Financial Credit", "Agricultural Inputs", and "Harvesting & Marketing Support", using digital technology. (The project provides four types of support: Training & Education, Financial Credit, Agricultural Inputs, and Harvesting & Marketing Support. In addition, Babban Gona is promoting the expansion of initiatives that were initially directly managed by Babban Gona by franchising them through entrepreneurs.



Source: Babban Gona Annual Report, 2020

Note: BGD: Babban Gona Direct (directly managed division), TCE: Trust Group Entrepreneur (franchise division)

Note: A trust group consists of 5 to 7 members including the leader.

Figure 2-59 Babban Gona Franchise Model

Babban Gona's franchise model is said to have established one successful model for agricultural support in Nigeria, and is said to have influenced the agritech companies that were subsequently established, such as Thrive Agric and Farmcrowdy. Although each company's methods of organizing farmers and the scope and content of their VC services are unique, they all share a common business model of organizing and empowering farmers, and then working with related institutions to generate revenue while providing the necessary services.

In areas where the formation of cooperatives has lagged behind, the involvement of these companies has enabled farmers to organize and develop human resources, upgrade agricultural production technology, receive financial support, procure materials, and develop sales channels, and in this way, these companies have taken on the function of a real cooperative. Given the form of agricultural promotion efforts by these start-ups, the first effective partner for agricultural support would be a partnership with an organizer company that unites the field and support institutions. Many donors have been developing agricultural promotion in collaboration with such organizations, and the potential for collaboration is high. In order to be particularly effective at an early stage, it is considered effective to work with organizations that are large in scale and have established credibility, especially in terms of the number of farmers they support and the number of warehouses and other base facilities they have.

(2) Major organizers as candidates for collaboration

The table below summarizes the 12 companies that are relatively large in size and have a proven track record of activities. The 11 companies that were identified through interviews as candidates for

collaboration with JICA are AFEX, Alluvial Agriculture, BabbanGona, Farmz2U, Thrive Agric, and Zowasel. Each company has its own unique business activities, such as operating a private commodity exchange, buying farmers' products, or acting as an intermediary, but they all share the same goal of generating business income by helping small farmers organize, improve productivity, develop sales channels, and raise funds. The number of farmers supported by Alluvial Agric is expected to increase from 1.2 million (2022) to 5 million (2030), Babban Gona from 300,000 (2022) to 1 million (2030), and Thrive Agric from 514,000 (2022) to 10 million (2030). The impact is expected to be significant, including.

AgroMall, FarmCenta, Farmcrowdy, and FarmKonnnect also have almost similar business schemes, and although their direct needs have not been confirmed, they are considered candidates for collaboration. In particular, AgroMall, in addition to its large scale, has a proposal for improving farming operations called Bank of Agricultural Transformation (BoAT) that utilizes Agents, and is likely to be a candidate for collaboration.

Table 2-88 Initiatives by organizer companies

Company ※founded ※employee	Services and business model	Function				Scale of initiatives ① reach farmers ② other
		Extensi on	Input support	Market access	Finance , Insuranc e	
AFEX ※2014 ※201-500	- AFEX is the first privately owned commodity exchange in Nigeria. - AFEX provide 2 major applications, workbench for management including e-warehouse receipt and ComX for trading. - AFEX operate currently about 180 warehouses, planning to increase to 500 in Nigeria	○ by FEO .	○ via app (Work Bench).	○ WH + ComX	○ Sterling Pula etc.	① Farmers 443,604(2022) ② warehouse: 181(2023) 500 (2030) ③ Turn over: USD 306million (2022), USD 500million (2024) ④ Financial needs: USD 1.5 billion (2024) ※ Interested in cooperation with JICA
Agroarche ※2020 ※51-200	- Agritech uses digital technology to improve farming operations, provide input materials, improve market access, and provide financial support to solve major issues in the agricultural value chain. It offers this through a solution called Kasuwa as a platform. - It is a new agritech established in 2020, with a focus on the northern part of the country.	○ Kaswa + EA	○ Kasuwa	○ Kasuwa	○ FCMB etc.	① Farmers 50,000 (2022) ② Trading 40,000 MT ③ Turn over USD 7 million (2022)

Company ※founded ※employee	Services and business model	Function				Scale of initiatives ① reach farmers ② other
		Extensi on	Input support	Market access	Finance , Insuranc e	
Alluvial Agriculture (AA) ※2016 ※51-100	- AA is an agri-tech engaged in collective farming. It supports farmers by organizing "block farms" headed by a community leader. - In Adamawa, AA collaborate with Adamawa University, secured 5,000 ha land.	○ by EA	○ Provide d by AA	△ Sold by AA	○ MC etc.	① Farmers 1.2M (2022) 5M by2030 ② Potential borrowing demand: N 450 billion ※ Interested in cooperation with JICA
Babban Gona ※2012 ※501-1000	- BG offers farm inputs, credit, marketing, and training services to the trust group as a support unit (currently 29,000). - BG is enlarging their business by franchise model (BG manage only 9,400 directly) - BG's business model is to collect fees for services provided.	○ Farm U + EA	○ Provide d by BG	△ Sold by BG (Nestle etc.)	○ FCMB	① Farmers 300,000 (2023) 1M (2030), 10M(2050) ② Franchisee: 300(2030), 2,600(2030) ③ Cultivation areas: 56,000 ha(2023), 1,750,000ha(2030) ④ Investment: N48billion (2030) ※ Interested in cooperation with JICA
Farmz2U ※2014 ※1-10	Farmz2U provide web application (FMP) that supports smallholder farmers from pre-farming to post harvest with digital extension services and market access.	○	○	○	○	① Farmers 30,000 (2022) ※ Interested in cooperation with JICA
Thrive Agric ※2016 ※51-100	- TA supports clusters of farmer communities, each of which appoints a leader and provides training to farmers based on GAP. - TA provide 2 major applications, AOS for management and tradr for trading. - It has MoU with Nigerian Commodity Exchange	○ by EA	○ via app. (AOS)	○ tradr	○ Sterling , FCMB etc.	① Farmers 514,000 (2022), 10M(2030), of which 4M women(2030) ② warehouse: 450(2022) ③ revenue: USD 500 million, full time stuffs: 500(2030) ※ Interested in cooperation with JICA
Zowasel ※2019 ※11-50	- Zowasel provides a marketplace that efficiently connects various actors in the food value chain. - Its activities are based on 45 Crop center which function	○ Crop Center + by EA	○ via app	○ via app + report	○ Vbank SimliFi P2Vest + Scoring system	① network of farmers: 2M (2022) ② crop center 45(2023) ③ investment

Company ※founded ※employee	Services and business model	Function				Scale of initiatives ① reach farmers ② other
		Extensi on	Input support	Market access	Finance , Insuranc e	
	not only warehouse but also community center. • Zowasel also provides scoring and traceability services.				(ACCE SS)	USD 1 million in 5 years ※ Interested in cooperation with JICA
AgroMall ※2016 ※11-50	• AM is an agri-tech that provides farming advice and farm management solutions using digital tools to support smallholder farmers and agricultural professionals. • AM Provides a farm management platform system called ADAP • AG advocate a reform model agency called Bank of Agricultural Transformation (BoAT)	○ by EA	○ via app (ADAP)	△	○	① Farmers 1.3M(2021) ② BoAT hub 3,000 (plan)
Farmcenta ※2018 ※11-50	• Farmcenta is an agri-tech company that provides agricultural consulting, financing, and commodity aggregation services. • It provides platform that connect sponsors and farms • Clustering centers in 10 states	○	○ Provide d by FC	△ Sold by FC	○	① work with 5,000farmers over 4,000ha (2018) ② dairy cow 6,000 (2018)
Farmcrowdy ※2015 ※11-50	• Farmcrowdy provides a platform to connect sponsors and farmers for value chain efficiency. • VC with intermediate distribution distributed using 101 aggregation sites (FC aggregation). Also offers e-commerce for consumers (FC Foods)	○	○	○	○	① network of farmers: 427,331 (2022)
FarmKconnect ※2017 ※201-500	• FK is a agriculture real estate company that promotes collective farming, whereby interested individuals with common interest collaborate towards large scale commercial agriculture. • It provides application AFIDE	○	○	△ Sold by FK	○	① network of over 50,000 farmers(2022)

Source: Based on interviews, each company's web information, crunchbase, and linkdIn.

Note: Companies with 11 or more employees are listed, except for Farmz2U, which was interviewed.

○: applicable, △: partially applicable

Below are two examples of efforts by organizer companies, Babban Gona and Alluvial Agriculture, that illustrate the process of collectivization of farmers. In addition to organizers, there are other potential partners that provide services in individual sectors along the value chain. In particular, large off-takers and financial institutions such as large banks and insurance companies may be effective partners, as they may be involved in farm management activities themselves or provide farm management support in collaboration with organizers. These companies for specific services are discussed below.

● Organizer company case 1 | Babban Gona

Babban Gona is an agricultural support company that was established in 2012 with the aim of supporting small-scale farmers and has achieved remarkable results. According to Kola Masha, founder of Babban Gona, farmers' cooperatives in Nigeria are often poorly led, lacking formal education, professional management knowledge, and investment capital. According to Kola Masha, founder of Babban Gona, farmer cooperatives in Nigeria lack leaders with formal education, professional management knowledge, and investment capital, which prompted Babban Gona to organize the Trust Group.

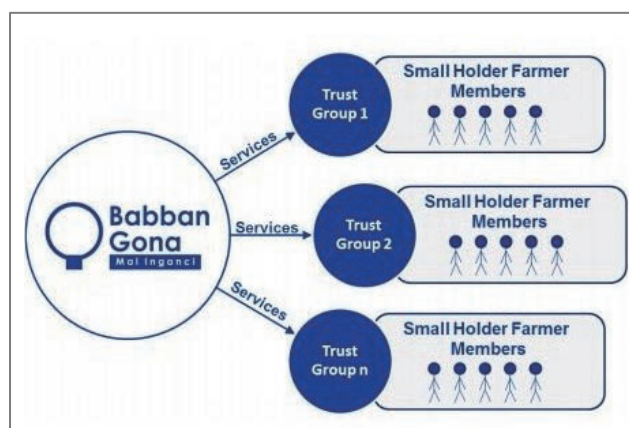
In organizing Trust Groups, Babban Gona strictly selects group leaders, who are assigned four to six members. Babban Gona will provide the following four services to the organized Trust Groups through their leaders.

① Training & Education

Training on best practices, management leadership, and financial literacy will be offered through Babban Gona Farm University (Farm U). Training will continue throughout the season and topics will be revisited at monthly meetings.

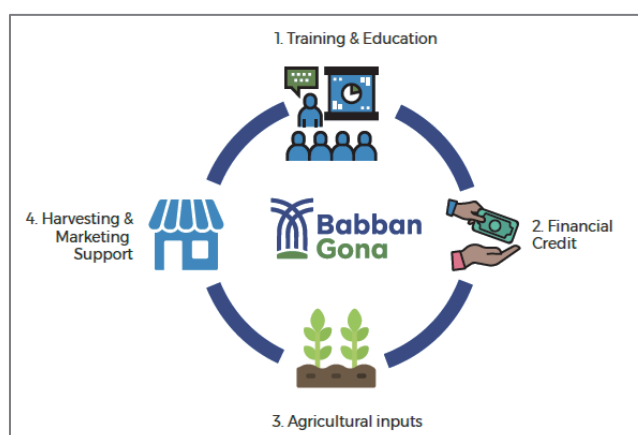
② Financial Credit

Recognizing that securing financing is crucial for smallholder farmers to grow, the company mitigates default risk through evaluation and works with financial institutions to provide low-interest, cost-effective loans.



Source: Kola Masha, Agriculture: Nigeria's Job Creation Engine

Figure 2-60 Concept of Trust Group



Source: Babban Gona web site

Figure 2-61 Service Delivery Model of Babban Gona

③ Agricultural Inputs

Babban Gona procures high-quality inputs from market-leading manufacturers and provides them to cooperative members. High-quality inputs and training in their proper use have helped members improve their productivity.

④ Harvesting & Marketing Support

Babban Gona assists its members with storage methods, access to markets, etc., to ensure and increase ultimate profits.

Production by the Trust Group was initially managed directly by Babban Gona, but is now managed by franchisees under the "Babban Gona Direct programme (BGD)" and the "Trust Group Entrepreneur programme (TGE)", respectively. The new business is called "BGD (Babban Gona Direct programme)" and "TGE (Trust Group Entrepreneur programme)", respectively. In addition, new programs such as women's support and poultry farming are being considered as new projects.

According to the interview, the future goal is to expand the number of farmers supported by the program from the current 300,000 to 1 million in 2030 and 10 million by 2050. Currently, Babban Gona spends USD 1,000 per farmer; USD 400 on agricultural inputs (of which 10-15% is operational costs) and USD 600 on produce. Simple calculations indicate a projected financing demand of USD 1 billion in 2030. With this demand for funds, Babban Gona has shown strong interest in funding through TSL.

Table 2-89 Initiatives of Babban Gona

Feature		Agricultural support through franchise model
Key Player		Babban Gona
Foundation		2012
Business Model		Based on the Franchise Model, Babban Gona is developing support by forming a trust group as the target of support. Babban Gona's business model is to collect fees for services provided.
Engaged Farmers & other Impacts		- Number of participants: 300,000 (2023), 1 million in 2030, 10 million in 2050 - Area cultivated by small farmers: 56,000ha(140,000acre)Jobs created: 299,494 - Farmers' income compared to national average: more than double
Commodities		The main products are grains such as maize, corn, rice, soy beans, etc., but some poultry is also being produced.
Organizing		Babban Gona deployed more than 2,000 field officers to organize farmers as trust groups and support their farming activities.
Production Support	Extension service	- Babban Gona Opens Farm University (Farm U) to train 110 digitalization support field officers were deployed in collaboration with partners
	Procurement, Production	Babban Gona procures high quality seeds, fertilizers, etc. from manufacturers and supplies them to farmers.
	Logistics	Babban Gona provides warehouses where the quality of the products is evaluated according to quality, size, etc.
	Market access	Babban Gona develops business with Off takers such as Nestlé and others to support farmers' sales.
Financial Support	Payment	Babban Gona opened an account in cooperation with FMBC. In addition, Babban Gona promotes the implementation of a POS settlement system (MoMo) in collaboration with First Bank.
	Loan, Credit	Work with partner banks and donors to provide loans to farmers through trust groups
	Insurance	Worked with insurance companies to develop weather index insurance and promote risk mitigation for farmers

ICT (network, application etc.)	• Babban Gona promotes systemization of mechanization, monitoring, inventory management, etc. using AI. • In cooperation with Rippleworks, Babban Gona is looking for a general manager, IT administrator, and other personnel to build a system that allows them to manage their own systems.
Prospect and Challenge	• It has a goal of expanding its population to 1 million in 2030 and 10 million in 2050. • It also plans to expand its land for development to 1,750,000 hectares by 2030.
Potential cooperation with doners & JICA	• The company has a strong interest in TSL, as it has significant financial needs for future business development.

Source: Prepared based on interviews, Babban Gona Annual Report, site information, etc.

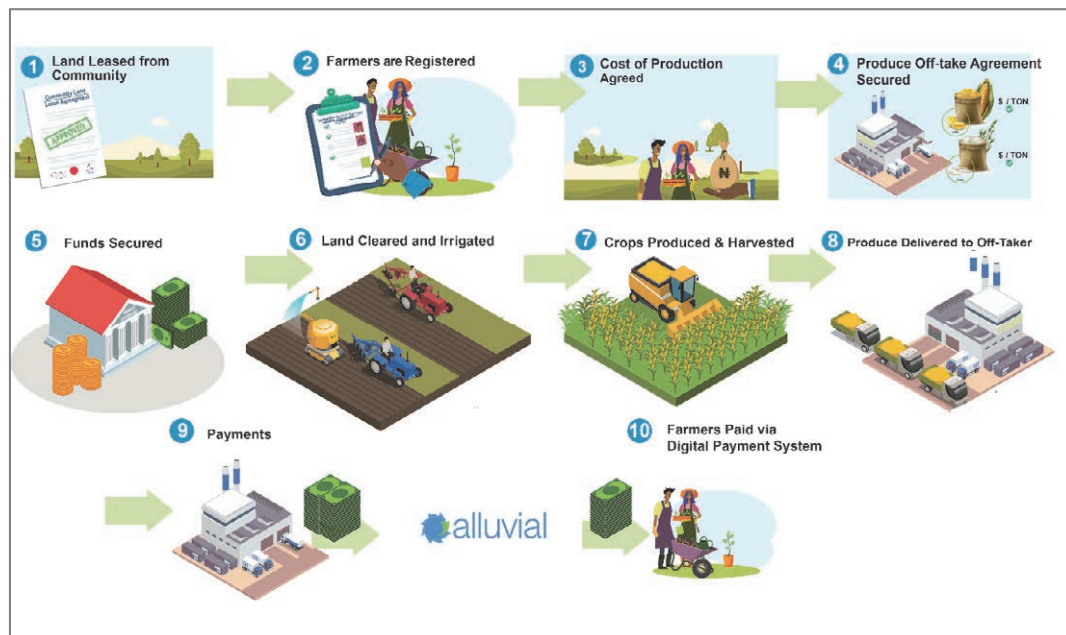
● Organizer company case 2 | Alluvial Agriculture

Alluvial Agriculture is an agri-tech engaged in collective farming. Originally, the company intended to produce rice on 2,000 ha of farmland in Cross River State, which it had obtained permission to purchase from the government. The company began to support local farmers as a service provider, by securing commissions from them, rather than expropriating their land and producing their own products.

The unique feature of the program is that it supports farmers in the community by organizing them into units called "block farms" headed by a community leader. Alluvial provides support by leasing farmland from community landowners, registering farmers, and concluding Cost of Production Agreement with the registered farmers. Alluvial also provides extension services to the registered farmers through their leaders to improve their productivity.

To secure a sales channel for the product, Alluvial manage to secure Produce Offtake Agreement with an off taker, raised the necessary funds, and secured revenue through the VC, while Alluvial has implemented a business model in which it collects commissions as a service provider.

In terms of the support process for block farms, Alluvial organizes the process into 10 steps: (1) Land Leased from Community, (2) Farmers are Registered, (3) Cost of Production Agreement, (4) Produce Off-take Agreement Secured, (5) Fund Secured, (6) Land Cleared and Irrigated, (7) Crops production & Harvest, (8) Produce Delivered to Off-Taker, (9) Payments, (10) Farmers Paid via Digital Payment System.



Source: Alluvial web site (<https://alluvialtrade.com/>)

Figure 2-62 Agricultural Support Process of Block Farming Model

According to the hearing, the future goal in Nigeria is to expand the current number of supported farmers from 1.2 million to 5 million by 2030. As a specific project, it is planned to develop 5,000 ha of land in Adamawa State, which has been secured, based on the concept of Block farm in cooperation with Adamawa University.

According to a written survey conducted during the hearing, the demand for funds over the next five years is estimated to be N 10 billion for Alluvial itself and N 35 billion for related entities (N1.25 million for off-takers, N10 billion for farmers, and N12.5 billion for cooperatives). Against the backdrop of the large demand for funds, Alluvial has shown interest in TSL funding and is a strong candidate for collaboration.

Table 2-90 Financial demand of Alluvial Agriculture

Item		Scale
Capital size		#1,054,071,00 NGN
Shareholders		Kemedi, Dimieari Vo Agri- Africa Netherlands BV Inyang, Joseph
Amount is potential financial (borrowing) demands in 5 years	Alluvial Agriculture	#10,000,000,000 NGN
	Off-takers	#12,500,000,000 NGN
	Farmers	#10,000,000,000 NGN
	Cooperatives	#12,500,000,000 NGN

Source: Answers to questions for Alluvial Agriculture

Table 2-91 initiatives of AlluvialAgriculture

Feature	Agricultural Support by Block Farming Model
Key Player	Alluvial Agriculture, IDH
Foundation	2016
Business Model	To collectivize farmers, the company leases farmland from landowners, enters into agreements with registered farmers regarding production cost, and enters

		- produce off-take agreement with off-takers. A business model is developed to generate commission income through production support. - Alluvial promotes collectivization based on the Community Block Farming Model. Services are provided based on the Service Delivery Model (SDM) developed by The Sustainable Trade Initiative (IDH).
Engaged Farmers & other Impacts		- Supports more Than 100,000 farmers in Nigeria through Initiatives with MasterCard and IDH. - Currently support 1.2 million farmers. - Aiming to create 2 million jobs in Africa in the future.
Commodities		Rice, Maize, Soy beans, Cassava, Sesame, Ginger
Organizing		Alluvial leases farmland in communities, coordinates collective farming, and develops production based on Alluvial's farming know-how.
Production Support	Extension service	Alluvial provides agricultural extension services.
	Procurement, Production	Alluvial procures and supplies seeds, fertilizers, etc. and promotes mechanization such as tractors.
	Logistics	Alluvial handles logistics to off-takers.
	Market access	Alluvial handles off-taker contracts.
Financial Support	Payment	Alluvial offers app-based payment system.
	Loan, Credit	Alluvial secures funding and provides to farmers.
	Insurance	Alluvial adjusts its offerings.
ICT (network, application etc.)		Alluvial uses the application for farmer registration and management and provide Market Information and Digital Payment System.
Prospect and Challenge		- The company sets a goal of expanding the number of farmers it supports in Nigeria from the current 1.2 million to 5 million by 2030. - As a specific project, 5,000 ha of land has been set aside in the Adamawa region, and there are plans to promote development in collaboration with Adamawa University. - In collaboration with MasterCard, the company is focusing on support by women and expanding into Kenya, Ghana, Ethiopia, Uganda, and Rwanda. The goal is to create 2 million jobs across Africa in the future.
Potential cooperation with donors & JICA		- I Funding needs (N45 billion) exist for future development. - The interviews also indicated interest in TSL funding against the backdrop of large-scale funding needs.

Source: Based on interviews, Alluvial site (<https://alluvialtrade.com/>), IDH site, etc.

2.5.3 Startups and Other Initiatives in the Agricultural VC | Service providers in distinct fields

Examples of potential partner companies providing individual services with which collaboration could be considered were classified into the following categories: farm support/information provision, material supply/mechanization, market access (marketplace, off-taker), and finance/insurance.

(1) Farming support and information provision

Companies that provide farm management support and information include Airsmat, ProbitFirm, and TradeBuza, which offer solutions utilizing information processing technologies, such as the use of satellite information, data linkage through APIs, and information processing through AI. In some cases, they provide data-enabled agricultural guidance, but they provide assistance to the extent that they do not go into the organization of cooperatives.

Zenbus is also noteworthy for its contribution to the spread of smart farming through the supply of devices that measure and analyze soil data such as temperature, nutrients, and vegetation health, as well

as providing support for farming operations. If precision agriculture becomes widespread in Nigeria, there is a possibility that the need for farm management support for the use of sensors and other devices will increase.

Table 2-92 Initiatives by Farm advisory & Information Service Provider

Company ※founded ※employee	Services and business model	Function				Remarks
		Extensi on	Input support	Market access	Finance, Insurance	
Farm advisory & Information						
Airsmat ※2019 ※11-50	- Airsmat is a software development company with strengths in AI technology. - Provides a subscription application platform that takes the guesswork out of day-to-day farm management to help you make better decisions	○			△ partner Sterling Bank	Funding requirement USD1.5million (2022)
Alsofarm ※2017 ※11-50	Alsofarm provides tailor-made pre-harvest activities, records, and other management software for small farmers.	○				
Green Development Agro Allied Service ※2018 ※11-50	- GD&AAS offer a comprehensive range of services in agriculture, including farm establishment and management, technical assistance and training for farmers, recruitment and training of farm workers, both field and virtual consultancy for farmers, input recommendation and sales, as well as the supply of fresh vegetables to various target markets. - They describe their business model is based on BOT model	○	○			
Probit Farms ※2017 ※51-100	Probit Farms is a software company that develops and provides field management software primarily for livestock and field farmers. Provides modules for managing records of farming and livestock activities, as well as financing and expense management.	○				Investment: USD 21.3billion (2022)
Releaf ※2017 ※101-200	- Releaf is a supply chain technology company that supplies raw materials to the food industry. - Provides farmers with information necessary for palm cultivation and mills with services related to	○			○	

Company ※founded ※employee	Services and business model	Function				Remarks
		Extensi on	Input support	Market access	Finance, Insurance	
	processing in the field of vegetable oil					
Trade Buza ※2017 ※1-10	• TB is a AgriTech firm based on data management & API • TB provides following solutions; Trade Buza Capture, Trade Buza AgroAPI, Trade Buza Agro. • TB performs their system mostly for anchor companies under ABP so far.	○			○	※ Interested in cooperation with JICA • having concern to corporate with NAVSA
Verdant AgriTech ※2014 ※11-50	• Verdant AgriTech provides market information, management support, and market access opportunities to smallholder farmers through mobile-based digital solutions.	○		○		
Zenbus ※2011 ※11-50	• Zenbus is the AgTech business of Nigeria-based First Atlantic Semiconductors & Microelectronics Ltd (FASMICRO). • Supplies devices that measure and analyze soil data such as temperature, nutrients, and vegetation health • Also provides support for farming operations	○	○			•

Source: Based on interviews, each company's web information, crunchbase, and linkdIn.

Note: Companies with 11 or more employees are listed, except for TradeBuza, which was interviewed.

○: applicable, △: partially applicable

(2) Input materials and Mechanization Service

On the input supply side, many companies are involved in tractor and other equipment rental, with Hello Tractor specializing in tractor owner and demander matching services, and as a tractor owner, the company is combining its efforts to cultivate businesses that are engaged in the rental business. According to interviews, the company has a large procurement demand, aiming to secure 2,000 small-scale tractors in the next five years. In addition, Standage is focusing on importing used Japanese agricultural machinery (tractors, combine harvesters, and rice milling machines) and anticipates particular demand for combine harvesters.

Table 2-93 Initiatives by Input materials & Mchanization Service Provider

Company ※founded ※employee	Services and business model	Function				Remarks
		Extensi on	Input support	Market access	Finance, Insurance	
Mechanization						
Farm4Me ※2017 ※11-50	• Farm4Me is a Farming Support Company Focusing on Contract Cultivation and machine rental service.	○	○	△ Sold by F4M	○ Investors +	• member investors 12,000+ • NLIP goal:

Company ※founded ※employee	Services and business model	Function				Remarks
		Extensi on	Input support	Market access	Finance, Insurance	
	- Providing comprehensive farm management support services including contract farming, farm equipment rental services, and agricultural products trading - They are undertaking Next Level Infrastructures Project (NLIP) to proceed farm mechanization, produce warehousing and agro-haulage				Leadway Assurance	rental machine tractor: 10,000 warehouse: 6,000 truck: 10,000
Hello Tractor ※2014 ※11-50	- HT is an agritech that connects tractor owners with smallholder farmers who need tractor services. - HT provides tractor sharing solutions and lease service which promote tractor ownership and rental services by cooperatives.	△ for tractor use	○ Provided by BG		○ FCMB	- registered tractors: 3,000+ - planning to add 2,000 small tractors in 5years
Tohfan ※2003 ※5,001-10,000 (incl. Tractor owners)	- Tohfan is a cooperative organization for owning and leasing tractors in Nigeria. - Offers tractor rental services. Supplies tractors in 31 states nationwide	○ on GAP	○			- farmer: 200,000+ (2018) - deployed tractor : 552(2018)
Standage ※2017 ※1-10	- STANDAGE is a Japanese-affiliated trade support company, trying to import Japanese second-hand agricultural machinery such as combine and rice milling machine to Nigeria with MC and Zowasel. - While its core business is trade, it has also developed a business model to organize cooperatives and to collect fees through VC support.	△	○	△	○	※Interested in cooperation with JICA project

Source: Based on interviews, each company's web information, crunchbase, and linkdIn.

Note: Companies with 11 or more employees are listed, except for those interviewed (Standage).

○: applicable, △: partially applicable

(3) Market access

In addition to the aforementioned organizers, there are off-takers that provide sales channels through contract farming and marketplaces that provide direct sales channels to farmers.

Off-takers such as Dangote, FMN, Tomato Jos, and Olam, in addition to providing sales channels in cooperation with organizers, own and operate their own large-scale farms, and are actively working to add value from the production stage. For example, Dangote is working on quality control using sensors in its sugar farms. OLAM, which owns about 4,500 ha of farmland and produces crops for export, uses

an application called OFIS for advanced production management. These companies engaged in large-scale production are likely to make large investments for quality control and other purposes.

As for marketplaces, Tingo Mobile offers Nwassa, a marketplace where farmers can sell their crops; Nwassa will be adopted by AFAN in 2023, and its use is expected to grow (The potential membership is reported to be as high as 60 million)¹²⁶. Coamana also offers Amana Market, which handles small farmers' produce and provides support to small farmers. Other companies that provide online venues for produce include Agro Domain, EveryFarmer, Foodstock Farmers Market, and Winich Farms.

Table 2-94 Initiatives by Market Access Service Provider

Company ※founded ※employee	Services and business model	Function				Remarks
		Extensi on	Input support	Market access	Finance, Insurance	
Off-taker						
Dangote ※1978 ※10,001～	• Dangote is a Large domestic conglomerate with different VC production lines such as sugar, rice etc. • such as sugar, rice, and tomatoes	○	○	○	○	• reached farmer 100,000
Flour Mills of Nigeria (FMN) ※1960 ※5,001-10,000	• FMN is one of Nigeria's leading food companies. • FMN is also involved in agrarian reform, providing farmers with a platform to finance inputs as well as weather information through its subsidiaries, providing advice to farmers, and promoting productivity.	○	○	○ contract farmin g	○	• reached farmer 16,000+ • MN's platform is being developed by its subsidiary GAIL
Tomato JOS ※2014 ※11-50	• Tomato JOS is the largest tomato processor in Nigeria. • Promoting farmer revitalization through education, logistics, and improved market access	○	○	○ contract farmin g	○	• network of farmers : 3,000 (2022)
OLAM ※2089 ※101-200	• OLAM is an agricultural products trading company established in Nigeria and operating worldwide. • It manages the entire VC with Olam Farmer Information Systems (OFIS), a VC-wide digital solution.	○	○	○ contrac t farming	○	• farmers; 500,000(2021) • farm area 4,500ha
Market Place						
AgroDomain ※2016 ※11-50	• AgroDomain connects buyers and sellers of agricultural products and provides a marketplace where both parties can negotiate. • Also launched an online store for dealers of farm inputs, poultry, livestock, machinery, and other produce-related products			○		

¹²⁶ Market Seeker, All Farmers Association of Nigeria Adopts Tingo Mobile's Nwassa Marketplace Platform for its Members, November 13, 2023

Company ※founded ※employee	Services and business model	Function				Remarks
		Extensi on	Input support	Market access	Finance, Insurance	
CoaMana ※2018 ※11-50	- Coamana is a Socio-Technology Company focused on Strengthening Market Linkages Across Communities in Sub-Saharan Africa. - In December 2019, Coamana piloted our digital marketplace, Amana Market, to link Nigeria's farmers and small businesses to an ecosystem of markets, information and financial services.	○		○ Sterling Bank	○	- benefittedfarmers 150,000+ - financial access 10,000 farmers
EveryFarmer ※2018 ※11-50	EveryFarmer is a provider of agricultural SCM solutions. Providing farmers with solutions for farm management, cultivation and marketing.	○				
Foodstock Farmers Market ※2016 ※11-50	Foodstock Farmers Market is an online farmers market which provide fresh produce direct from the farmer to the consumer.			○		
Tingo Mobile ※2000 ※11-50	- As a subsidiary of Tingo Group, Tingo Mobile serves rural farming communities through two solutions, Nwassa and Tingo Pay. - Nwassa is a marketplace where farmers can list and sell their produce to local and international buyers. Tingo Pay is a digital payment services, which facilitates bill payments, airtime purchases, and data top-up services, and also provides lending and insurance services.			○	○	- Nwassa Marketplace Platform is adopted by AFAN in 2023. - Its potential membership is said to be 60M
Winich Farms ※2012 ※11-50	Winich Farms is an agri-tech company that provides a platform that enables producers and processors/retailers to trade directly with each other without the activities of middlemen.			○		Connecting over 40,000 smallholder farmers

Source: Prepared based on interviews, information on each company's Web site, crunchbase, and linkdIn.

Note: ○: applicable

(4) Finance and insurance

Banks, venture capital, and other financial institutions often take a cautious stance toward the agricultural sector, based on the perception that the sector is risky, but there are companies that provide

specialized services for agriculture, such as FMCB, Sterling Bank, and WEMA Bank. These financial institutions often work with a wide variety of organizers and are likely to be a partner when providing loans to organizers and others.

In the insurance industry, the NAIC, which works with the government, is expected to assist in the digitization of farm surveys. In addition, Pula Advisory, a major VC firm, has been working with VC-related companies, such as material manufacturers, off-takers, and financial institutions, as direct customers, and is also involved in farm management support by leveraging its knowledge.

In addition, there are Riby, which has extensive experience in cooperative support, SystemSpec, which operates NAVSA and other government decision-making platforms, Vbank, which provides financial support in cooperation with ZOWASEL, SimpliFi, P2Vest, and others.

Table 2-95 Initiatives by Financial Institutions & Insurance company

Company ※founded ※employee	Services and business model	Function				Remarks
		Extensi on	Input support	Market access	Finance, Insurance	
Finance						
FCMB ※1982 ※1,001-5,000	- FCMB is a local bank established without government support. - The bank's agribusiness team supports various agricultural and its value chain businesses with trade and commodity structuring; works with Thrive Agric and others. - Long-term borrowing needs exist for agricultural land development, etc., but lack of trust and sustainability of the association are perceived as challenges.				○	- Working with many AgriTech such as Babban Gona, Tomato Jos ※Interested in cooperation with JICA
Riby ※2015 ※11-50	- Riby, an investment firm of Growth Capital, develops digital apps and supports cooperatives and farmers through POS agents with bank accounts (payment for sales, payment for materials, etc.). - There is a funding need by TSL for investment capital for the cooperatives supported by Riby and for Debt Finance, an agricultural and fintech company invested by Growth Capital.	△		△ Off taker	○	- Register cooperatives: 3,000 - Agent2,500 - Planning to start extension service in 2024 ※Interested in cooperation with JICA
Sterling Bank ※2015 ※11-50	Sterling Bank is a full service national commercial bank that also focuses on supporting agriculture-related deposits, payments, and loans.				○	※Interested in cooperation with JICA

Company ※founded ※employee	Services and business model	Function				Remarks
		Extensi on	Input support	Market access	Finance, Insurance	
	Active in supporting agriculture and working with AFEX to provide block-enabled solutions					
SystemSpecs ※1960 ※1,001-5,000	- SystemSpecs is a software house which participates as a partner in NAVSA, the federal government's agricultural digital platform. - It provides the payment platform, "REMITA".				○	
SimpliFi ※2021 ※1-10	SimpliFi is a credit information agency; it works with ZOWASEL as a Credit Guarantee Provider.				○	
Vbank(VFD Micro Bank) ※2014 ※1-10	VBank is a digital bank that works with ZOWASEL to offer deposits, payments and loans.				○	- Potential sub loan 1B NGN ※Interested in cooperation with JICA
WEMA BANK ※1945 ※1,001-5,000	- WEMA BANK is the first fully digital bank in Africa, with a digital platform called ALAT and agents to provide services throughout the country. - WEMA BANK is willing to participate in TSL and TA, including digital support in states where there are no branches.				○	※Interested in cooperation with JICA
Insurance						
NAIC ※1993 ※201-500	- NAIC is an agricultural insurance company that is eligible to utilize federal subsidies and has offices in various states. It has a dominant market share in agricultural insurance in Nigeria and offers insurance services through an app - The company has expressed hope for support to address the digitization of field surveys through tablets.				○	- investors 12,000+ - rental machine (goal) tractor: 10,000 warehouse: 6,000 truck: 10,000
Pula Advisors ※2018 ※51-200	- Pula Advisors is a leading insurance company providing insurance services with a focus on the Area Yield Index. It also provides support for farming operations. - The Nigerian representative has a farm in Oyo and has a network and contacts.	○			○	※Interested in cooperation with JICA

Company ※founded ※employee	Services and business model	Function				Remarks
		Extensi on	Input support	Market access	Finance, Insurance	
	Interested in livestock and poultry farming.					
P2Vest ※2020 ※11-50	• VBank is a digital insurance company that works with ZOWASEL to offer insurance service.				○	

Source: Based on information from hearings, each company's web information, crunchbase, and linkdIn.
Note: Except for Hearing-related companies (SimpliFi, Vbank), companies with 11 or more employees are listed.

○: applicable, △: partially applicable

2.5.4 Federal and state government efforts to digitize VC

(1) National Adopted Village for Smart Agriculture (NAVSA)

NAVSA, the Nigerian Federal Government's Agricultural Digital Platform, is a digital platform to promote and accelerate government (federal, state, and local) policies in agriculture.

The Nigeria Digital Agriculture Strategy 2020-2030 (NIGERIA DIGITAL AGRICULTURE STRATEGY 2020-2030), developed by the National Information Technology Development Agency (NITDA), is a digital platform to promote and accelerate government (federal, state, and local) policies in agriculture. (The platform was developed by NITDA and released in November 2019 under the "Nigeria Digital Agriculture Strategy 2020-2030" developed by the National Information Technology Development Agency (NITDA), and has the following goals and objectives.

◇Goals

- To build a sustainable digital platform that provides varieties of information for more than half of agriculture ecosystem players in Nigeria to enable a highly productive agribusiness economy.
- To partner with relevant agriculture programs to introduce digital capabilities that will enable about 6 Million new jobs across the agriculture value chain in Nigeria.
- To support agriculture sector with digital capabilities capable of attracting about 1 Million graduate talents and creating exciting new and well-paying job opportunities across the agriculture value chain.

◇Objectives

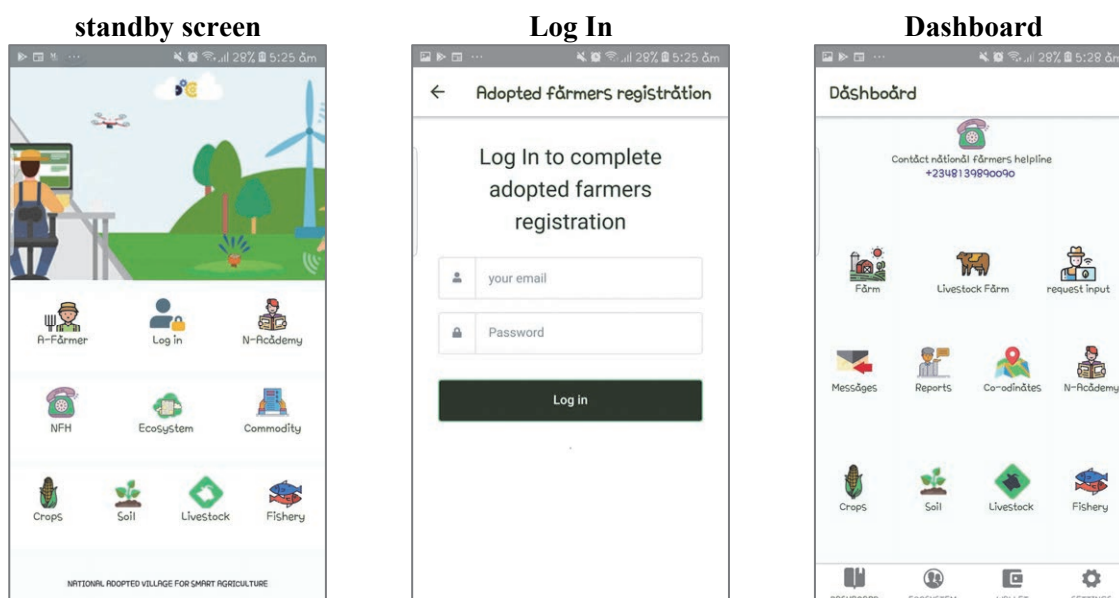
- To improve production and productivity of every NITDA adopted farmer on NAVSA platform by 35%. To increase the income of every NITDA adopted farmer on NAVSA platform by 30% at every harvest.
- To improve production and productivity of any other farmer on NAVSA platform by 20%. Increase the income of any other farmer on NAVSA platform by 15% at every harvest.

In addition to this, the target is set to reach 10 million farmers by 2032.
(Application features provided)

The functions provided by the NAVSA application are crop information (currently for Maize, Bean, Tomato, Cassava, and Rice), farmland information (weather and soil), and e-wallet (including procurement support), although market conditions information may be provided in the future. Satellite information is used for information on farmland and weather. It is also envisioned that the target products will be expanded to include livestock, poultry, and fisheries.

The difference between NAVSA and platforms provided by the private sector is that NAVSA aims to develop infrastructure for all farmers, whereas private operators target cooperatives that can ensure business viability. The emphasis is on human resource development, data standardization, security, and confidence building, which also contribute to private-sector platform initiatives and value-added improvements.

In providing services, in addition to government agencies such as FMAFS, which promotes agricultural policy, and NAERLS, which conducts agriculture-related research, NAVSA also collaborates with telecommunications carriers such as MTN and HOTSPOT, and private operators such as REMITA, which operates a payment platform.



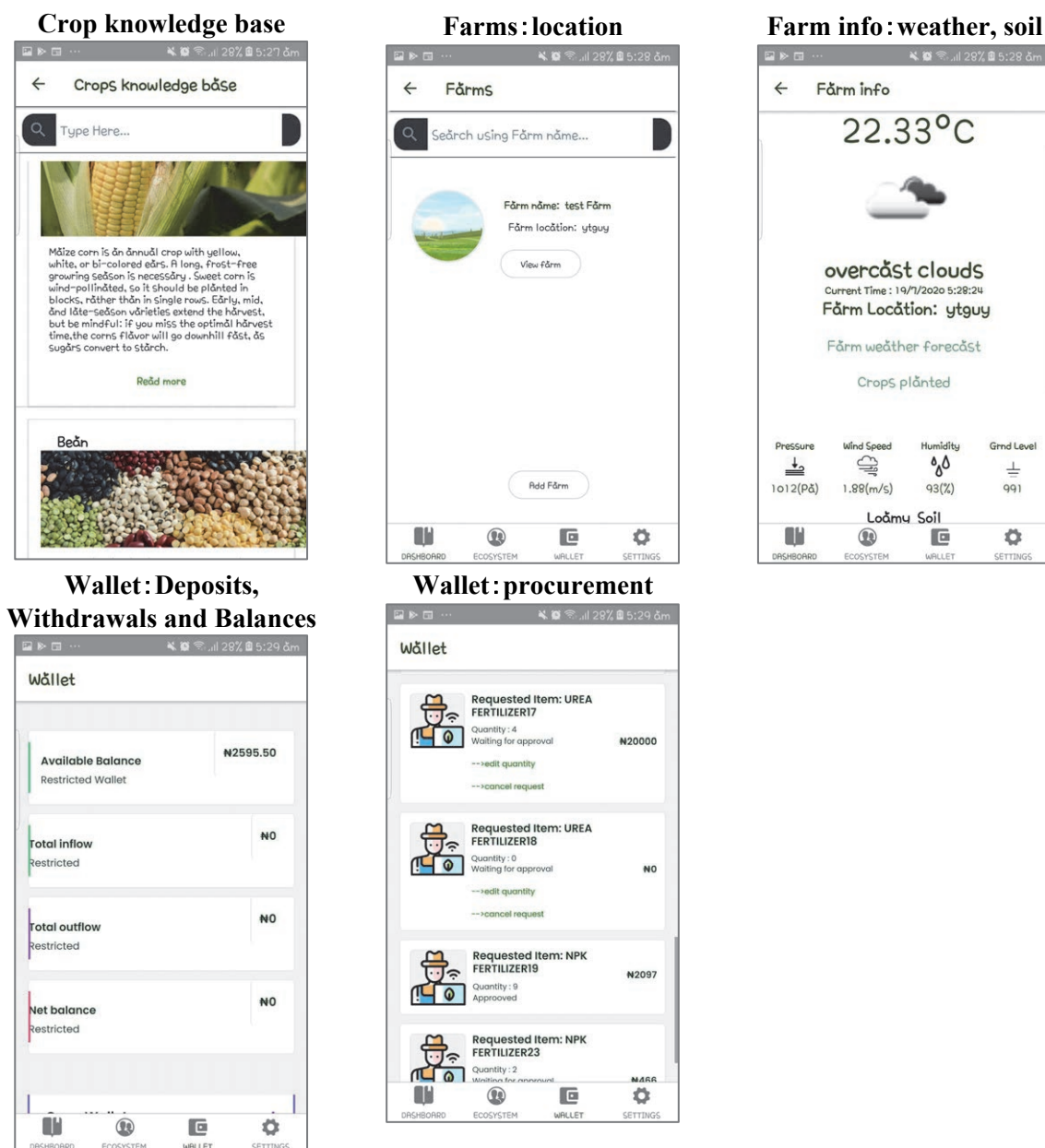


Figure 2-63 User Interface of NAVSA app

(Current Business)

Currently, as a pilot project, NAVSA is focusing on training new graduates in cooperation with universities, especially in collaboration with the Youth Agriculture Startup Scheme (YAS), taking advantage of the need for vocational training before university graduation in Nigeria¹²⁷.

The partner universities include University of IBADAN, Federal University Dutse (FUD), and Al-Qalam University, with 965 participants to date (approximately 100-150 participants/university). Currently, the partnership is with university agricultural departments, where NITDA provides seed money for training new graduates and an environment to use NAVSA, and the receiving university, led by a coordinator (currently the dean), utilizes these resources to train new graduates. Currently, six

¹²⁷ Initially, the program targeted farmers and others in Jigawa State, but due to difficulties in coordination, the program is now being developed in cooperation with universities.

people have been appointed as coordinators.

Specifically, participants selected for NAVSA, including university students, will receive 100,000 NGN of seed money, devices, and other support listed below once their drafted business plan is approved by the coordinator.

- Smart device(tablet)
- Seed fund of 100,000 NGN
- AgTech training/ capacity building
- Connectivity/ internet access
- Financial inclusion through digital wallets NAVSA platform(mobile app & web)
- E-extension and insurance services
- UAV/Drone for smart farm
- Portable green energy system
- Sustainability/ continuous reinvestment model
- Smart Demo Farm(smart irrigation and brooding systems, and soil intelligence systems)

Seed money is managed using e-wallets on the REMITA payment system.

The e-wallet consists of a closed-wallet, which can be used only for limited purposes, and an open-wallet, which can be used freely. The initial seed money of 100,000 NGN is transferred to the closed e-wallet upon approval of the business plan by the university coordinator.

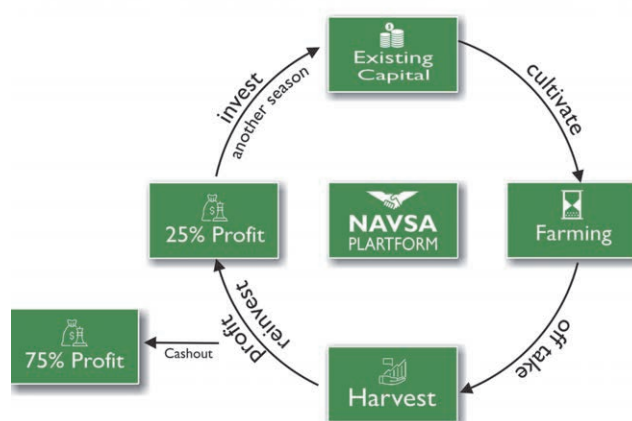
Later, when the farmers sell their products through farming activities and make a profit, 75% is transferred to an open e-wallet that can be freely used by transferring the money to their own bank account, while 25% is transferred to a closed e-wallet with limited use. This ensures the sustainability of the business and promotes its expansion.

In order to enable this type of cash management, NAVSA transfers the sales proceeds of the grower's products to the e-wallet once they are sold to the four NAVSA-registered businesses. However, if the sale is made to a business that is not registered with NAVSA, the coordinator can transfer the funds to the e-wallet on behalf of the business.

(Future Outlook)

NITDA is still in the start-up phase, and according to interviews with NITDA, the number of users is currently limited to approximately 965 farmers in 10 states, NITDA is providing training programs and funding to university students and others in each state in order to realize the goal and promote the program.

Sustainability Model



Source: NITDA

In implementing NAVSA, the project is working to digitize farm households with support from the FAO's Pilot Digital Villages Initiative and is also looking at investment and development partnerships with a view to making NAVSA self-sustaining in the future. Expectations for JICA's support are extremely strong.

On the other hand, NITDA's budget for NAVSA for FY2024 is only N70,000,000, and in order to expand the project, securing funding for development is an issue. NITDA is currently providing seed money using NITDA's budget, but NITDA is considering a scheme that would allow it to work with seed money providers and provide operational support for the platform (see the Figure below).

In the implementation of NAVSA, the FAO's Pilot Digital Villages Initiative has been supporting the digitization of farm households, but with a view to the future self-sustaining operation of NAVSA, support organizations that can act as investment and development partners are required. In addition, NAVSA has high expectations for support from the World Bank and JICA, as it is expected to become a self-sustaining organization in the future.

In supporting NAVSA, it is possible to consider support for strengthening the government's nationwide platform for agricultural support, and financial assistance for fostering producers with digital technology.

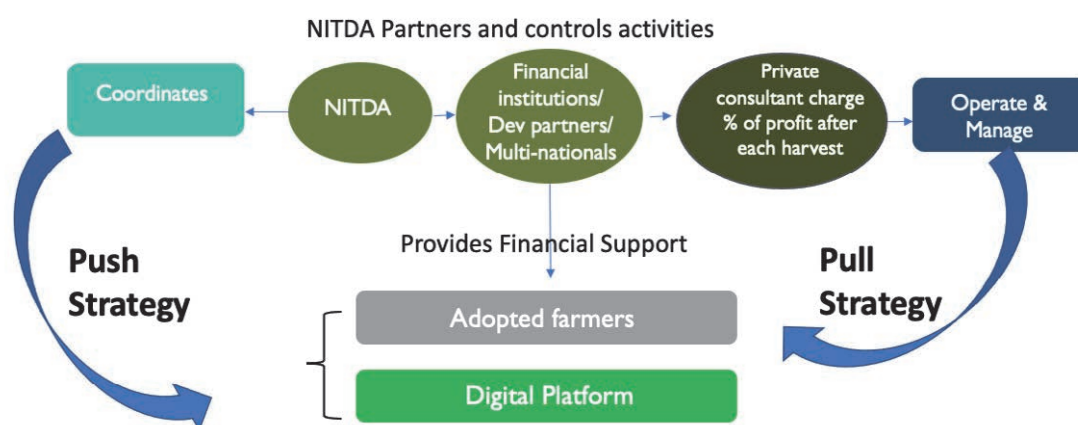


Figure 2-64 NITDA's vision for NAVSA's future operating scheme

Table 2-96 Initiatives of NAVSA

Feature	Agricultural Digital Platform by the Federal Government (National Adopted Village for Smart Agriculture: NAVSA)
Key Player	National Information Technology Development Agency : NITDA
Foundation	2019
Business Model	- NITDA creates a platform to promote and accelerate government policies in agriculture in accordance with the Digital Strategy for Agriculture (2020-2030). - Unlike projects by private entities seeking revenue, NITDA provides services to all farmers. Focus on data standardization and building a platform that contributes to security to promote private sector initiatives.
Engaged Farmers & other Impacts	965 farmers (2023) (Target: 10 million farmers in 2032) 10 provinces, 1,369 ha (Target: 36 provinces, 774 municipalities) 965 direct jobs (target: 6 million in 10 years)

Commodities		• Crops, livestock, poultry, and fisheries
Organizing		• Currently focusing on youth human resource development (Youth Entrepreneur Scheme). Model initiatives are being implemented in Gombe, Jigawa, Ekiti, Ogun State, etc., bringing together pre-graduation technical trainees, university students, and farmers to promote the platform (participants whose business plans are approved are provided with a smart device and 100,000 NGN in start-up capital, with 75% of business profits going into an open e-wallet. The start-up capital is provided in the form of a closed e-wallet with limited use, and 75% of the business profits are transferred to an open e-wallet for free use.)
Production Support	Extension service	• NITDA collaborates with NAERLS to post information on growing crops on NAVSA. (Information on Maize, Bean, Tomato, Cassava, Rice)
	Procurement, Production	• Soil and weather information posted on NAVSA • Ordering and payment of fertilizers and other materials through e-wallet
	Logistics	• No information
	Market access	• Market information might be posted on NAVSA
Financial Support	Payment	• Provides e-wallet mechanism using REMITA, a payment platform by SystemSpec
	Loan, Credit	• Provide NAVSA educational program participants with an e-wallet that can be used for procurement of materials, etc. (N100,000 as seed money) • Work with FMAFS to support grant disbursement • Participants request funds to purchase materials through the app, and once approved by the coordinator, the funds are transferred to the e-wallet.
	Insurance	• NAIC joins as a partner
ICT(network, application etc.)		• Work with MTN and HOTSPOT (telecommunications providers) to develop a communications environment • Application available on Google Play (released on November 26, 2019; users limited to approved participants)
Prospect and Challenge		• The goal is to have 10 million farmers use the system by 2032. In addition to the development of the application, it is necessary to promote the spread of the system and accelerate efforts. Nigerian universities require students to receive vocational training before graduation, and we expect to increase the number of participants through this mechanism. • Currently, NITDA operates NAVSA, but in the future it will be necessary to establish a self-sustaining management mechanism.
Potential cooperation with donors & JICA		• They are working with FAO (Pilot Digital Villages Initiative) to improve ICT literacy among farmers. • There are high expectations for support organizations that can serve as both investors and development partners, and they are strongly seeking collaboration with JICA's efforts.

Source: NITDA, based on interviews with FAO, NAVSA website, Google Play website, and FAO report (Pilot Digital Villages Initiative in Africa)

UNIVERSITY OF IBADAN, UI

Venue:
First Bank Hall, Faculty of Agriculture,
University of Ibadan, Oyo State, Nigeria

Programme Date:
11th to 17th February, 2023

Training Date:
13th to 17th February, 2023

Closing Date:
17th February, 2023

National Adopted Village For Smart Agriculture (NAVSA)

- Making digital technologies and innovations affordable and accessible for maximizing agricultural outcomes;
- Building and connecting agriculture ecosystem for Sustainable Jobs Creation Across Value Chain; and
- Leveraging Digital Innovations to Position Agriculture Sector for Economic Diversification.

PROF. ISA ALI IBRAHIM PANTAMI FNCs, FRCs, FIM
Hon. Minister of Communications & Digital Economy | **Special Guest**

KASHIFU INUWA COE
DG/CEO, NITDA | **Host**

PARTNERS

NAIC NAERL MTN HotSpot SystemSpecs

#Smart Irrigation System #Smart Brooding System #Solar Power kits

@NITDANigeria | www.nitda.gov.ng

Source: NAVSA Nigeria on Twitter (<https://twitter.com/NAVSANigeria>)

Figure 2-65 NAVSA Training at the University of Ibadan

(2) Agricultural Digital Platform by State government (Ogun State Farmer Information Management System: OGFIMS)

Ogun State is working on the Ogun State Economic Transformation Project (OGSTEP) with the support of the World Bank, and as part of the project, Ogun State is collaborating with the International Institute of Tropical Agriculture (IITA) to establish a digital platform for agriculture, OGFIMS, as a state government initiative. As part of the project, the state government is working with the International Institute of Tropical Agriculture (IITA) to establish a digital platform for the agricultural sector, OGFIMS.

OGFIMS plans to provide one-stop services for reforming the entire value chain to support small-scale farmers in farming and nutrition, with a target of 100,000 farmers registered and using the platform. The specific functions to be provided include cultivation timing, technical assistance, weather information, government support information, and e-marketing, with IITA in charge of system development. NAVSA, which is promoted by the federal government, is also conducting training and other activities to promote NAVSA in Ogun State, but the two are being developed as separate efforts.

According to the interview information provided by JICA, the portal site will be opened to the public in April 2023, but the system itself is not yet open to the public, and only the database function for agricultural enterprises exists.

Regarding the database, the survey started in July with the aim of collecting data on all agricultural enterprises, including farmers in Ogun State, and 51,598 data had been entered as of the end of October. The data collected includes the name, gender, and education of the head of the agricultural enterprise, the crops produced and handled, and annual income. The database is expected to be populated by the end of this year.

In January 2024, the database will move to the second phase, where it will be integrated with the market platform function (matching farmers with suppliers, off-takers, etc.) being developed by IITA.



Source: IITA website (<https://www.iita.org/news-item/digital-platform-for-smallholder-farmers-launched-in-ogun-state-nigeria/>)

Figure 2-66 OGFIMS Launch Event

Table 2-97 Initiatives of Ogun State Farmer Information Management System: OGFIMS

Feature		Agricultural Digital Platform by State government (Ogun State Farmer Information Management System: OGFIMS)
Key Player		Ogun State + IITA(International Institute of Tropical Agriculture) + WB (World Bank)
Foundation		2022
Business Model		As part of the Ogun State Economic Transformation Project (OGSTEP) supported by the World Bank, Ogun State in collaboration with IITA, WB, established a platform to contribute to smallholder farmers' farming and nutrition support.
Engaged Farmers & other Impacts		Set a goal of registering 100,000 farmers with IITA (51,598 data entries have been made as of the end of October 2023)
Commodities		Information on agricultural and livestock products will be posted.
Organizing		Plans to provide a one-stop service for reforming the entire value chain to support small farmers in farming and nutrition. Specific activities to come.
Production Support	Extension service	Provide information on growing season, technical assistance, etc.
	Procurement, Production	Plans to provide a matching function with suppliers on the market platform
	Logistics	No information
	Market access	Plans to provide a matching function with off-takers on the market platform
Financial Support	Payment	No information
	Loan, Credit	No information
	Insurance	No information
ICT (network, application etc.)		- IITA will take the lead in developing and releasing the platform in collaboration with related organizations (as of April 2023, only the portal site is available; a survey of farmers is being conducted and a database is being created). - Phase 2 will begin in FY2024, and market platform functions (matching farmers with suppliers, off-takers, etc.) are scheduled to be developed. - The registered entities have the ability to update data, but the actual operation is still in the planning stage.
Prospect and Challenge		- The portal site has just been opened to the public, and the challenge is to develop database functions, market platforms, and establish them through operational verification. - This is a separate initiative from NAVSA, which is promoted by the federal government.
Potential cooperation with donors & JICA		This is a collaborative effort with the World Bank (funding) and IITA (technical assistance), and JICA's role needs to be clarified in its support.

Source: JICA hearing information, IITA site information, etc.

2.5.5 Implications for Supporting the Agricultural Sector

Based on the above-mentioned digitalization and startup trends in agricultural VC, it can be said that Nigeria has produced a large number of startups, and that the private sector is taking the lead in promoting technological innovation and operational improvement in the agricultural value chain, even though union activities are stagnant in many cases. Therefore, in providing support to the agricultural sector, it is effective to take advantage of such private sector initiatives.

In providing support to the agricultural sector, the following points are important

◆Support through collaboration with organizer companies with proven track records

In many start-up agricultural support projects, the core organizer company provides services necessary for production by using local agents to organize and empower farmers, and then collaborating with specialized institutions such as manufacturers of seeds, fertilizers, and other materials, off-takers such as food manufacturers, and financial institutions. In many cases, they provide services. The organizer firms maintain an ecosystem that sustains agricultural production and plays the role of a real cooperative.

Several leading startups are anticipating future expansion, including Thrive Agriculture, which aims to expand number of registered farmers from 514,000 in 2022 to 10 million in 2030, and Alluvial Agriculture, which aims to expand number of registered farmers from 1.2 million in 2022 to 5 million in 2030. There are several companies that are expected to expand in the future. There is also a demand for large-scale future investment, such as Alluvial Agriculture, which expects to invest NGN 45 billion (USD 56million), including related entities, and AFEX, which announced in November 2023 that AFEX will raise USD 26.5million for the expansion of 20 warehouses in the future. In particular, it is noteworthy that warehouse and clean center development is being developed as a foundation for improving the distribution and quality of produce.

Therefore, in supporting agriculture, it would be effective to work with these core start-ups in addition to functioning cooperatives. Since many of these start-ups have weak management foundations, it is important to confirm their track record and business stability before cooperating with them.

◆Responding to mechanization needs, etc.

It is expected that individual services other than those provided by the organizer will be provided in cooperation with the organizer company, but individual cooperation may be considered if necessary for technical support.

In particular, large investments are required for agricultural machinery, and separate support may be provided. For example, the efforts of Hello Tractor, which plans to secure 2,000 small tractors over the next five years, and Standage, which aims to promote the use of Japanese tractors, combine harvesters, and rice milling machines, are noteworthy.

◆Cooperation with federal government initiatives

Although federal and state government initiatives are still in the early stages of implementation, they are working to collect farmer and farmland information, create databases, and develop human resources, and are expected to contribute to the establishment of a foundation for the future.

In particular, NAVSA, which was established by the federal government's NITDA and aims to be used by 10 million people by 2030, aims to promote entrepreneurship through the acceptance of pre-university vocational interns and to expand the use of the infrastructure.

NITDA has high expectations for JICA's support, as it faces the challenges of securing funds and providing development assistance to build a framework for future self-sustaining operations, and it is considered effective to promote its efforts through collaboration. It is possible to support the expansion of the period of information linkage infrastructure for nationwide agricultural promotion, promotion of

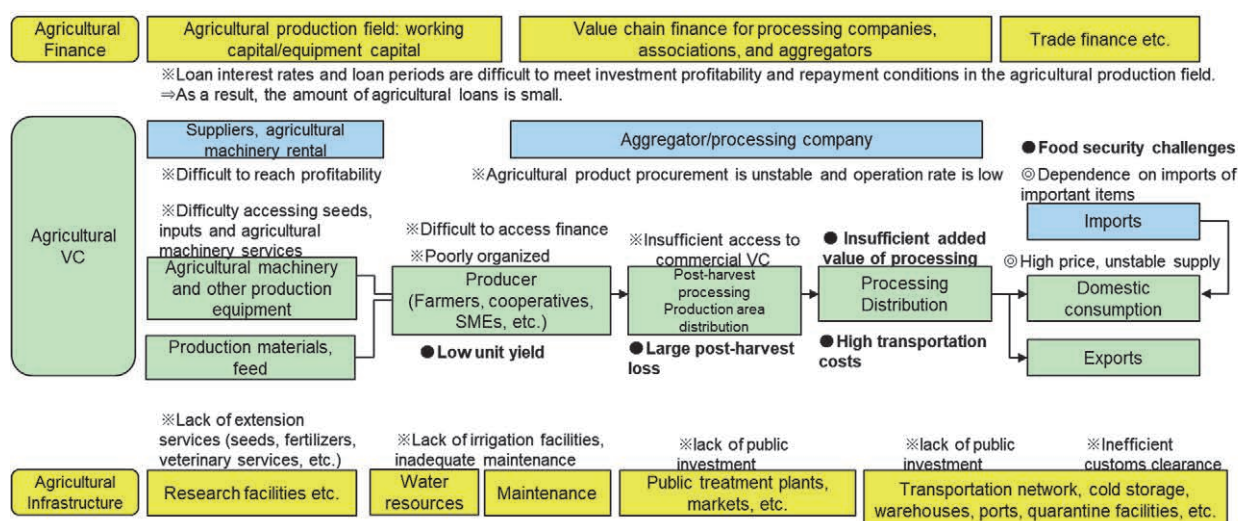
entrepreneurship by students who have received vocational training using NAVSA, and expansion of farm management guidance, etc.

2.6 Cooperation Policy for Nigeria Agricultural Sector

In order to consider the draft cooperation policy, the areas necessary to address agricultural VC issues will first be considered. Next, the programs that JICA is implementing in Nigeria will be sorted out, and cooperation policies and business proposals that will make effective use of the results and assets of JICA programs will be considered. Then, the possibility of complementarity and synergy with other donors' projects will be sorted out for these project proposals.

2.6.1 Areas of support needs based on agricultural VC issues

As described in 2.2.6, in this study, along with agricultural VC, The issues at each stage were organized into inefficiencies and their causes. Stages are; production stage (supply of agricultural production materials, feed, agricultural machinery, production equipment, and farming operations by farmers and agricultural producers); post-harvest processing stage; production area distribution stage, distribution stage from production area to consumption area, and processing stage. Regarding agricultural finance, issues such as general interest rates and loan terms not meeting the investment profitability and repayment conditions needs of the agricultural production sector were sorted out. Furthermore, regarding agricultural infrastructure, production infrastructure and Lack of investment resources for distribution infrastructure, maintenance issues, etc. were sorted out. These problems are hindering productivity improvements in the agricultural sector as a whole and are the background to food security issues such as domestic food supply shortages, price increases, and dependence on imports for major items (see figure below).



Source: Prepared by the Study Team

Figure 2-67 Issues in agricultural VC, agricultural finance, and agricultural infrastructure

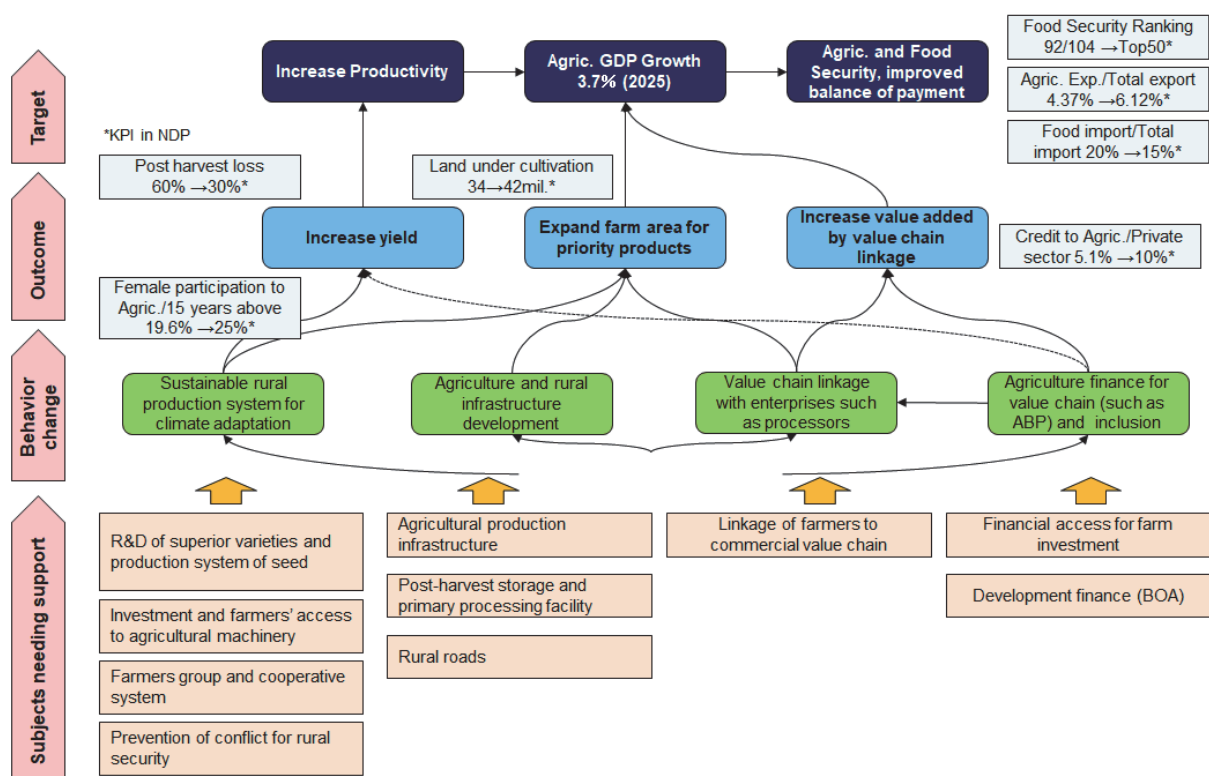
Many of these agricultural VC inefficiencies, agricultural finance, and agricultural infrastructure problems are caused by issues in the agricultural sector, particularly at the production stage, post-harvest processing, and production area distribution stage. Fields with great support needs can be organized as

shown in the table below.

Table 2-98 Areas with great support needs from the perspective of issues in the agricultural sector

VC		Areas of Support Needs
Production stage	Input	1. R&D of superior varieties and production system of seed 2. Investment and farmers' access to agricultural machinery
	Farming	3. Agricultural production infrastructure 4. Farmers group and cooperative system 5. Financial access for farm investment 6. Development Finance (BOA) 7. Prevention of conflict for rural security
Post-harvest processing stage; production area distribution stage;		8. Post-harvest storage and primary processing facility 9. Linkage of farmers to commercial value chain 10. Rural roads
Distribution stage from production area to consumption area		11. Main roads
Processing stage.		12. Industrial policy from the perspective of competitiveness of processed products (Improving issues at the production stage, post-harvest and rural distribution stage)

On the other hand, Section 2.3 summarized the Nigerian government's agricultural sector policies. Among them, the NDP's agricultural sector development goals include raising productivity in the agricultural sector, accelerating GDP growth in the agricultural sector, and improving agricultural and food security. During the field survey, the study team created a chart of the outcomes necessary to achieve these goals and behavioral changes to achieve them, and exchanged opinions with local stakeholders. The areas of support needs to address each of the issues mentioned above are positioned in this chart (see the figure below), and as a result, support needs areas 1 to 10 are considered to be important as areas of support needs for the agricultural sector.



Source: Created by the Study Team. The study team organized the goals and KPIs for the agricultural

sector of the NDP, set the outcomes and behavioral changes necessary to achieve these goals, and organized the positioning of areas in need of supportssupports.

Figure 2-68 Areas of support needs and targets for the agricultural sector in the NDP

2.6.2 JICA's cooperation policy and achievements in Nigeria

JICA has the following policies and initiatives for agricultural support in the African region.

Table 2-99 JICA's agricultural support policies and initiatives in Africa

Policy/Initiative	Period	Outline
CARD: Coalition for African Rice Development Phase 22	Since 2019	CARD aims to double rice production in Sub-Saharan Africa from 28 million tons to 56 million tons targeting 32 countries in Sub-Saharan Africa. It works to improve the income and livelihoods of farmers by developing irrigation in response to climate change, developing rice varieties, promoting rice business, and strengthening the competitiveness of domestically produced rice by improving rice quality.
SHEP: Smallholder Horticulture Empowerment and PromotionPromotion	Since 2006	The SHEP approach is an approach to support small-scale horticulture farmers that was developed in a technical cooperation project implemented by the Ministry of Agriculture of Kenya and JICA that began in 2006. By supporting small-scale farmers to practice agriculture as a business (market-oriented agriculture), it will increase the agricultural income of small-scale farmers and reduce poverty in rural areas. It also aims to contribute to ensuring food security through stable food production and supply.
IFNA: Initiative for Food and Nutrition Security in AfricaAfrica	2016 to 2025	In order to promote nutrition improvement in African regions where nutrition indicators are poor, African countries and support organizations work together to promote concrete on-the-ground multi-sector initiatives and support the achievement of nutrition improvement goals. It is working on formulating nutrition improvement strategies in African countries and promoting and disseminating nutrition improvement practices that go beyond the boundaries of existing fields. Going forward, they will focus on 1) strengthening political leadership, 2) human resource development, and 3) on-the-ground nutrition improvement projects, especially the Nutrient Focused Approach (NFA) to the agricultural sector, which aims to supply agricultural products and food necessary for adequate nutrition.
AFICAT: Africa Field Innovation Center for Agricultural TechnologyTechnology	Since March 2022	It is sequentially operating pilot projects in five countries: Tanzania, Kenya, Cote d'Ivoire, Ghana, and Nigeria, focusing on agricultural machinery related to rice. The public and private sectors will work together to accumulate issues and various lessons learned regarding the introduction and utilization of advanced technologies in order to contribute to the development of African agriculture through AFICAT.
Project NINJA (Next Innovation with Japan)	Since January 2020	Project NINJA is the brand name of JICA's entrepreneurial support activities aimed at creating business innovation in developing countries. In collaboration with various stakeholders, it implements entrepreneurship awareness activities, identifies issues faced by entrepreneurs and makes policy recommendations, strengthens corporate management capabilities, promotes collaboration between entrepreneurs in each industry, and also matches entrepreneurs in developing countries with Japanese companies and promote

Policy/Initiative	Period	Outline
		investment. In the agricultural field, there is support for agritech startups.

Source: Prepared by the Study Team based on information collected from JICA's website, etc.

In line with the above support policies and initiatives, the direction of JICA's development cooperation for Nigeria is based on the following four perspectives. 1) Perspectives on development cooperation in Nigeria (main development issues and contributions to the region), 2) Consistency with Japanese policy, 3) Past cooperation with Nigeria and utilization of Japan's assets, and 4) Development of cooperation in light of the unstable security situation. From these perspectives, JICA has organized its three priority areas and five development issues to be addressed, and has derived seven cooperation programs corresponding to each development issue. Among the seven cooperation programs, two programs have been set as top priority programs: the agricultural development program and the health and medical system strengthening program. There are also two priority programs: the business environment improvement and innovation promotion program, and the peace and stability program. There are three other programs: the power supply improvement program, the urban development program, and the nutrition and sanitation program.

The table below summarizes JICA's various cooperation programs and JICA's cooperation results in agriculture-related fields (including agricultural development programs as well as projects related to NINJA and IFNA, which are projects that particularly contribute to supporting farmers).

Table 2-100 JICA's cooperation programs and cooperation achievements in agriculture-related fields

Priority Area	Development Issues	Cooperation Program	JICA Cooperation Achievement (Agriculture)
Building the foundation for a sustainable and resilient society for economic growth	Industrial promotion/diversification	Agricultural development program	[Technical Assistance] Rice Post-Harvest Processing and Marketing Capacity Building Project
			[Grant] Rice Seed Production System Reinforcement Project (CARD related)
			[Technical Assistance] Capacity building project for rice seed production expansion and quality improvement (To be implemented) (CARD related)
			[Technical Assistance] Advisor for Agricultural Development
			[Technical Assistance] Project on Promotion of Market-oriented Agricultural Extension System for Livelihood Improvement (SHEP)
		Business environment improvement and innovation promotion program	[Technical Assistance] Advisor for Entrepreneur Support and Innovation Promotion
	Power supply improvement	Power supply improvement	

Priority Area	Development Issues	Cooperation Program	JICA Cooperation Achievement (Agriculture)
		program	
	Urban development	Urban development program	
Building inclusive and resilient health and medical systems	Health and medical system strengthening	Health and medical system strengthening program	
		Nutrition and hygiene program	[Technical Assistance] Project on Capacity Development for Nutrition Improvement in Federal Capital Territory (IFNA related)
Promoting peace and stability	Humanitarian/reconstruction support	Peace and stability program	

※Red is the highest priority program, light blue is the priority program

Source: Prepared by the Study Team based on JICA “JICA Country Analysis Paper for the Federal Republic of Nigeria” (December 2022) p.23

Next, the table below summarizes the achievements of cooperation in agriculture-related fields.

Table 2-101 JICA's cooperation achievements in agriculture-related fields

Project Name	Implementation Period	Implementing Agency	Overview
Rice Post-Harvest and Marketing Pilot Project in Nasarawa and Niger States	2011 to 2016	Federal Ministry of Agriculture & Food Security (FMAFS)	[Technical Assistance Project] This project aimed to contribute to improving the quality of domestically produced rice in the target states by improving the quality of domestically produced rice in the target regions through identifying measures to promote the distribution of high-quality domestic rice, developing and improving grading standards for domestic rice, and developing the capacity of counterpart institutions, small-scale rice millers, parboilers, rice farmers, and distributors.
The Project for Enhancement of Rice Seed Multiplication System (CARD related)	2021	Federal Ministry of Agriculture & Food Security (FMAFS) National Cereals Research Institute (NCRI)	[Grant Aid] This project contributes to increasing the production of certified seeds and, in turn, strengthening the rice production system in Nigeria through improving the quality of rice breeder seeds and original seeds and increasing production volume by cultivating and producing seeds necessary for increasing rice production (breeder seeds, original seeds) and renovating facilities and providing equipment for post-harvest processing.
Advisor for Agricultural Development (CARD related)	2023 to 2025	Federal Ministry of Agriculture & Food Security (FMAFS)	[Advisor] - Specific recommendations for increasing seed productivity/production volume and strengthening the production system - Support for activities related to normalization of SHEP - Support for improving and promoting nutrition and food hygiene, etc. - Support for private sector collaboration activities such as promoting agricultural mechanization

			• Smooth implementation of JICA projects and cross-scheme strategic support
Capacity Building Project for Rice Seed Production Expansion and Quality Improvement (Planned to be implemented) (CARD related)	From 2024 (Planned)	Federal Ministry of Agriculture and Food Security (FMAFS), National Cereals Research Institute (NCRI), National Agricultural Seed Council (NASC)	[Technical Assistance Project] The Nigerian government has been participating in CARD Phase 2 since 2019, aiming to further expand rice production by developing high-quality seeds, improving quality control, and increasing the efficiency of agricultural work through mechanization. However, the lack of high-quality seeds and irrigation facilities are obstacles to increasing rice production, and it is highly expected that improving the quality of seeds will expand rice production and improve quality. In order to address the above issues, this project aims to expand rice production and improve quality in Nigeria by increasing the production volume and quality of breeder seeds and original seeds by strengthening the capacity of the National Cereal Research Institute (NCRI) and the National Agricultural Seed Council (NASC) under the Federal Ministry of Agriculture and Food Security.
Project on Capacity Development for Nutrition Improvement in Federal Capital Territory (IFNA (Initiative for Food and Nutrition Security in Africa) related)	February 2019 to February 2024	Government of Federal Capital Territory (Department of Economic Planning, Research and Statistics and Department of Agricultural Development Programs)	[Technical Assistance Project] The background to nutritional issues is a combination of factors, including a lack of knowledge about nutrition, a lack of hygiene, the selection of crops to grow, the amount of agricultural production and cultivation techniques, and a lack of planning in household budget management and food stockpiling management. This project developed an approach based on three areas: "nutrition and health and hygiene," "agriculture," and "lifestyle improvement." and it worked to improve the quality, quantity, and diversity of meals for households with mainly expectant mothers, infants under two years of age, and their mothers. It also conducted activities aimed at improving nutritional issues among residents across the pilot sites.
Project on Promotion of Market-oriented Agricultural Extension System for Livelihood Improvement (SHEP)	2020 to 2024	Federal Ministry of Agriculture and Food Security (FMAFS)	[Technical Assistance Project] The project goal is to improve the quality of extension activities that contribute to improving farmers' livelihoods. It is customizing and disseminating extension development tools for nutrition improvement through capacity building of FMARD staff and extension staff in each state, and in collaboration with JICA's "Project on Capacity Development for Nutrition Improvement in Federal Capital Territory". Twenty target states were selected based on their horticultural potential and number of extension workers.
Advisor for Entrepreneur Support and Innovation Promotion (Project NINJA (Next Innovation with Japan) related)	September 2021 to September 2025 (Planned)	Office for Nigerian Digital Innovation (ONDI)	[Advisor] Project NINJA was launched in January 2020 as JICA's entrepreneurial support activity aimed at creating business innovation in developing countries. The advisor is carrying out the following activities to strengthen ONDI's capacity in strengthening Nigeria's startup ecosystem: • Information gathering/networking • Support for practical management skills to solve social development issues

			• Collaboration with private companies Nigeria's focus sectors are agriculture, health, finance, logistics, education, security, and administration.

Source: Prepared by the Study Team based on information collected from JICA's website, etc.

2.6.3 Cooperation policy for the Nigerian agricultural sector in this study

All fields with great support needs from the perspective of issues in the agricultural sector are directly related to the "Agricultural Development Program", which is the highest priority program among JICA cooperation programs (indicated by "○" in the table below). Among these, for example, "Investment in agricultural machinery and farmer access to agricultural machinery services", "Organization of farmers, functions of agricultural cooperatives", "Finance access for production investment", and "Linkage of farmers to commercial VC". etc. are possible indirectly involved in the priority program "Business Environment Improvement and Innovation Program" (see "△" in the table below), since private companies, including startups and FinTech, play a large role in solving these issues in Nigeria. Including other support needs areas, the relationship with JICA cooperation programs has been organized in the table below with "○" and "△".

Table 2-102 Relationship between areas of support needs and JICA programs from the perspective of issues

Areas of support needs based on issues	JICA Program			
	Agricultural development	Business environment improvement and innovation promotion	Nutrition and hygiene program	Promoting peace and stability
R&D of superior varieties and production system of seed	○			
Investment and farmers' access to agricultural machinery	○	△		
Agricultural production infrastructure	○			
Farmers group and cooperative system	○	△	△	
Financial access for farm investment	○	△	△	
Development finance (BOA)	○			
Prevention of conflict for rural security	○			△
Post-harvest storage and primary processing facility	○			
Linkage of farmers to commercial value chain	○	△		
Rural roads	○			

Source: Prepared by the Study Team

Next, eleven (11) cooperation project proposals were listed that correspond to areas of support needs.

The details of each cooperation project proposal and its relationship to JICA's achievements will be discussed later.

Table 2-103 Areas of support needs and cooperation project proposals

Areas of support needs	Cooperation project proposals
R&D of superior varieties and production system of seed	1. Project to promote development of superior varieties and improve seed production systems
Investment and farmers' access to agricultural machinery	2. Human resources development to accelerate ecosystem of agricultural machineries:
Agricultural production infrastructure	3. Irrigation facility development project 4. Irrigation agriculture promotion project
Farmers group and cooperative system	5. Pilot projects on DX of cooperatives 6. Upgrading APEX system of agricultural and credit cooperatives
Financial access for farm investment	7. TSL Project for agricultural sector
Development finance (BOA)	8. Reform of BOA and agricultural policy finance
Prevention of conflict for rural security	9. Project to improve access to market information by pastoralists and reduce conflicts between pastoralists and farmers
Post-harvest storage and primary processing facility	10. State post-harvest infrastructure development project
Linkage of farmers to commercial value chain	(7. TSL Project for agricultural sector)
Rural roads	11. Rural roads development project

Source: Prepared by the Study Team

JICA's cooperation achievements in agriculture-related fields include CARD projects under the agricultural development program, SHEP, AFICAT, NINJA under the business environment improvement and innovation promotion program, and NIFNA-related projects under the nutrition and sanitation program. These cooperation achievements and the proposed cooperation projects of this study are summarized in the list below.

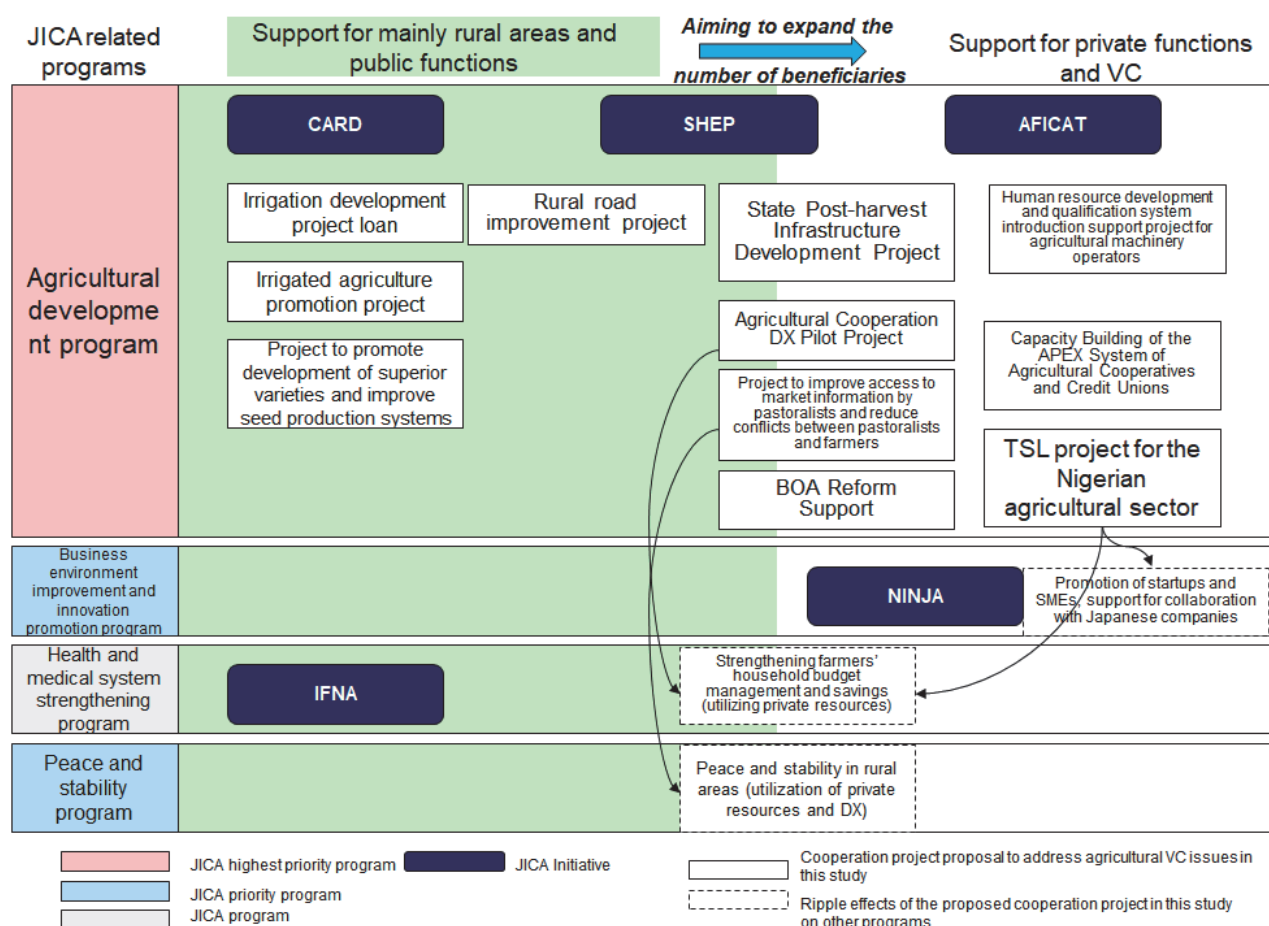
This study's cooperation policy for the Nigerian agricultural sector will aim to expand the number of beneficiaries, especially small-scale farmers through leveraging the experience and assets of JICA's cooperation in agriculture-related fields, and leveraging private sector functions, and extending this to the entire value chain. The background of this policy is as follows.

This study has looked at various factors that are hindering productivity improvement in Nigeria's agricultural sector. For example, each government extension worker is in charge of more than 1,000 farmers, and not only is he/she unable to handle them, but transportation is also limited, making it difficult to respond. On the other hand, private start-ups are self-sustaining, even though one rural manager is in charge of about 100 to 150 farms and conducts dissemination activities and monitoring.

Furthermore, with current ADP resources, SHEP training can only be held for two to four groups per year, and it will take time to disseminate the results widely. On the other hand, the private startups and large-scale farmers interviewed view SHEP training as an effective farmer screening method, and are considering ways to implement it while balancing profitability. Bank agents, another private resource, exist in large numbers in rural areas and have daily contact with farmers, conducting financial services such as remittances. Some startups are starting to multi-skill bank agents and incorporate them into business models that support farmers. As mentioned earlier, Nigeria has an advantage over other countries in terms of startups and banking agents. By utilizing these advantageous private resources, the

achievements of JICA's other cooperation projects will be expanded.

On the other hand, Nigeria's disadvantage is that the activities and organization of agricultural cooperatives are not sufficient. The proposed cooperation project of this study utilizes DX to improve and reform the activities of agricultural cooperatives and the APEX system, which will allow the private sector to utilize the achievements of JICA's cooperation to a wide range of areas.



Source: Prepared by the Study Team

Figure 2-69 Cooperation policy and project proposal for the Nigerian agricultural sector

2.6.4 Cooperation project proposal for the Nigerian agricultural sector

This study proposes cooperation policies and project plans for the next 15 years, and from among these, prioritizes projects in the agricultural finance and agricultural infrastructure fields for the next five years. Therefore, in the following, each project proposal will be categorized into project plans in the agricultural finance field, agricultural infrastructure field, and then other project plans, and each project plan will be described. Each project proposal should be listed in the following order: project name, period, implementing agency, scheme, project summary, utilization of JICA's cooperation achievement, and collaboration with other donor projects.

(1) Project Proposal for Agricultural Finance

There are four project proposals in the agricultural finance field as shown in the table below, three of which are priority project proposals for the next five years. Details of priority project proposals are provided in Chapter 3. Among the issues by stage of VC in the agricultural sector, issues related to the production stage, post-harvest processing, distribution in production areas, and agricultural finance issues organized in “2.4.5 Agricultural Finance” are mainly addressed.

Table 2-104 Project Proposal for Agricultural Finance

Project	Addressing challenges in the agricultural sector			Responding to challenges in agricultural finance
	Production stage	Post-harvest processing/production area distribution	Distribution/Processing	
[Priority project] TSL Project for agricultural sector	• Promotion of investment by agricultural producers and suppliers	• Promotion of investment in private post-harvest facilities • Promote linkage of farmers to commercial VC	Promoting investment by processing businesses	• Providing products that meet the needs of borrowers • Improving financial literacy of farmers
[Priority project] Reform of BOA and agricultural policy finance	• Promotion of investment by agricultural producers			• Development finance reform
[Priority project] Pilot projects on DX of cooperatives	• Promotion of farmer organization	• Promote linkage of farmers to commercial VC		• Providing products that meet the needs of borrowers
Upgrading APEX system of agricultural and credit cooperatives	• Strengthening the functions of agricultural cooperatives			• Development finance reform

Source: Prepared by the Study Team

Project name:	TSL Project for agricultural sector
Project period:	5 years
Implementing agency:	CBN, FMAFS
Scheme	Yen loan, Consulting services
Project Summary:	The Nigerian government's leading projects, ABP and CACS, have boosted agricultural loans to some extent, but the ratio of agricultural loans to private loans was 6% at the end of 2021, which is still far from the NDP's target of 10%. This project will provide funds through TSL to support the interest rate level and repayment period required by agricultural producers, and will also use these funds as a springboard to provide consulting services to improve farmers' commercial and financial literacy using SHEP as an entry point and provide support and linkage with agricultural VC companies. On the lender side, it will promote financial access through start-up farmer support services, support banks (and credit guarantee systems) to improve their ability to provide products, and support monitoring of target projects. This project aims to improve the productivity and income of the agricultural sector, especially small-scale farmers. It will be implemented through agricultural financing, which is one of the key items in the Nigerian government's agricultural sector productivity improvement policy.
Utilization of JICA cooperation achievements:	Synergistic effects with SHEP will be achieved by promoting the stage-up of farmers using SHEP as an entry point, and synergistic effects with CARD projects and AFICAT will be achieved by providing financial support for agricultural machinery investment.

	There will also be synergies between consulting services to support farmers' household management and financial literacy and IFNA-related projects, as well as synergies and collaboration with the NINJA project to promote financial access through startup farmer support services.
Collaboration with other donor projects:	Cooperation will be achieved by providing TSL financing for the investment needs of private companies derived from SAPZ and by linking these private companies and agricultural producers. In addition, market price information from VCDP-CAF (IFAD) will be used as a reference price for contract cultivation in this project.

Project name:	Reform of BOA and agricultural policy finance
Project period:	5 years
Implementing agency:	FMAFS, CBN
Scheme	Technical Assistance
Project Summary:	BOA is a development financial institution that supports farmers' access to finance through direct loans to farmers and loans through cooperatives. However, its current financial is weak, making it difficult to expand its business. The Nigerian government has positioned BOA reform as a priority policy and it will promote its digitalization. BOA is planning to revamp its accounting system. This project will support the reform of BOA's management system and financing business, and support the bidding, ordering, and implementation management of accounting systems that reflect the reforms and address these issues. The Nigerian government has indicated that it will review its development finance system. If specific steps for consideration are presented in the future, this project will also support the whole restructuring of development finance drawing on the experiences of Japan and other countries.
Utilization of JICA cooperation achievements:	Reform of development finance in the agricultural sector is also positioned as a bottleneck for the entire agricultural sector. It is hoped that the achievements of the CARD project, SHEP, and AFICAT will be expanded through private investment.
Collaboration with other donor projects:	The review of development finance is supported by the IMF, and the reform of the BOA will also be promoted in collaboration with the IMF.

Project name:	Pilot projects on DX of cooperatives
Project period:	4 years
Implementing agency:	FMAFS, NITDA
Scheme	Technical Assistance
Project Summary:	In Nigeria, the formal organization rate of agricultural cooperatives remains at around 30%, which is one of the challenges in farmers' access to finance and commercial venture capital. Under these circumstances, many start-up companies are providing pseudo-agricultural cooperative services, and success stories are emerging, but if left to commercial businesses, there is a risk that many farmers will be left behind. Meanwhile, NITDA is currently trialing NAVSA (a digitally-based farm management system). FMAFS positions the use of digital technology to improve the efficiency of extension services and policy implementation as a priority policy. This project aims to carry out a pilot project on the management of agricultural cooperatives using NAVSA and obtain suggestions for improving the regulation and systems of agricultural cooperatives in the future. Target crops include grains, vegetables, export crops, poultry farming, aquaculture, etc. that can be handled by NAVSA's functions. Livestock farming (particularly nomadism) will be considered as another project proposal.
Utilization of JICA cooperation achievements:	Collaboration to improve the management of agricultural cooperatives using NAVSA is positioned as part of improving the business environment and promoting innovation. In addition, synergies with IFNA-related projects will be sought, especially in collaboration with NAVSA's savings management function.
Collaboration with other donor projects:	While exchanging information with the Digital Village Initiative (FAO), it will collaborate on hypotheses to be tested in the pilot project.

Project name:	Upgrading APEX system of agricultural and credit cooperatives
Project period:	5 years
Implementing agency:	FMAFS
Scheme	Technical Assistance
Project Summary:	In Nigeria's cooperative system, there is no enforceable relationship between APEX, which is the upper organization, and cooperative units, and there is also a weak financial basis for support from APEX. For this reason, support for the activities of unit agricultural cooperatives cannot be said to be sufficient, nor can it be said that the rate of organization of farmers or the improvement in capital accumulation in organized cooperatives has been sufficient. The Nigerian government has placed the creation of a cooperative model that is substantially involved in agricultural VC in general as a priority policy. Based on the achievements of the "Agricultural Cooperative DX Pilot Project," this project will support the restructuring of agricultural cooperatives and credit unions' APEX systems and support schemes for specific unit cooperatives. Activities include operation of review committees, support for system design, and human resource development.
Utilization of JICA cooperation achievements:	Nigeria's cooperative system is an issue that affects the entire agricultural sector, and it is expected that the achievements of the CARD project, SHEP, and AFICAT will be widely disseminated. There will also be a synergistic effect in terms of strengthening water users' associations and other private organizations in order to sustainably achieve the results of the irrigation-related project proposals in this study.
Collaboration with other donor projects:	Agricultural cooperatives and credit cooperative systems are positioned as important channels of finance for the agricultural sector. This is an important part of the future vision for reviewing development finance for the agricultural sector, so it will be proceeded in collaboration with the IMF.

(2) Project proposed in the Agricultural Infrastructure

The four priority projects in the agricultural infrastructure are listed in the table below. Details of the priority project proposals are described in Chapter 4. Each project proposal mainly addresses issues in the production stage, post-harvest processing, and distribution at production areas among the challenges in the agricultural sector by VC stage.

Table 2-105 Project proposal for Agricultural Infrastructure

Project	Addressing challenges in the agricultural sector		
	Production stage	post-harvest processing stage and distribution at production areas stage	Distribution stage and Processing stage
[Priority project] Irrigation development project	• Strengthening agricultural production base		
[Priority project] Irrigated agriculture promotion project	• Improvement of operation and maintenance of irrigation facilities • Promotion of agricultural machinery utilization needs • Promotion of small-scale investment by farmers (stimulating needs)		
[Priority project] Rural roads improvement project		• Improvement of transportation roads	
[Priority project] State post-harvest		• Promotion of investment in post-harvest facilities such as storage and primary	• Operation improvement of processing businesses

Project	Addressing challenges in the agricultural sector		
	Production stage	post-harvest processing stage and distribution at production areas stage	Distribution stage and Processing stage
infrastructure development project		processing facilities • Promoting linkage of agricultural producers to commercial VC	

Source: Prepared by the Study Team

Project name:	Irrigation development project
Project period:	5 years
Implementing agency:	FMWRS, RBDA
Scheme	Project Loan
Project Summary:	In Nigeria, the number of people living in food shortages and the number of people living in poverty are both on the rise due to population growth, and there is an urgent need to address this issue. On the other hand, the yield of many major crops is lower than in neighboring countries, and there is a need to improve agricultural productivity. The introduction of irrigated agriculture not only improves agricultural productivity, but also makes it possible to plant crops during the dry season, which is difficult with rain-fed agriculture, and greatly contributes to improving the livelihoods of small-scale farmers in rural areas, where many of the poor live. For this reason, irrigation facilities will be developed as a project loan project. Major facilities in the Nasarawa (Laminga) area include water intake facilities, headrace channels (14 km), irrigation canals (approximately 64 km), access roads (approximately 61 km), waterways and road structures, drainage canals, offices, Agricultural machinery etc. In the Duku-Lade area there will be an earth dam (levee height 25 m, length 1.6 km), headrace canal (6 km), irrigation canal (17 km + tertiary canal), night reservoir, roads, administrative and administrative facilities, agricultural machinery, etc.
Utilization of JICA cooperation achievements:	This project will contribute to increasing the impact of AFICAT's results by creating a synergistic effect with the CARD project's increase in rice production and increasing the productivity of agricultural machinery utilization.
Collaboration with other donor projects:	With TRIMMING/SPIN (WB) (large-scale irrigation), it aims for synergistic effects through co-financing or developing nearby agricultural infrastructure. It will also consider collaborating with ATASP-I (AfDB), which supports small-scale irrigation facilities, to complement the project in the vicinity.

Project name:	Irrigation agriculture promotion project
Project period:	5 years
Implementing agency:	FMWRS, RBDA
Scheme	Technical Assistance
Project Summary:	Since many large-scale public irrigation facilities were constructed in the 1970s, they have become increasingly obsolete, and their functionality has deteriorated due to lack of ownership from beneficiary communities, lack of maintenance, deterioration, and vandalism. In addition, farmers' opinions are not reflected in business plans, and projects are implemented top-down, resulting in a decline in water use and delays in water usage fee payments. In response to this, participatory water management has been adopted, and a model for developing water user associations (WUA) has been formed in the WB TRIMMING from 2014 to 2024, and FMWRS plans to expand it nationwide. On the other hand, in order for farmers to take ownership of the maintenance and management of irrigation systems, they need to experience the benefits of irrigated agriculture. Therefore, by improving agricultural productivity and building a value chain for agricultural products, the project will aim to increase the income of farmers in irrigation areas. On the policy side, the NDP (2021-2025) includes a national irrigation development program in the water resources section, which calls for a total of 500,000 hectares of

	irrigation development by 2030. In addition, one of the cross-cutting intervention measures in NATIP is the sustainable use of land and water resources, and improvement of irrigation services for farmers is mentioned.
Utilization of JICA cooperation achievements:	This will contribute to increasing the impact of AFICAT's achievements by creating a synergistic effect with the CARD project's increase in rice production and increasing the productivity of agricultural machinery utilization.
Collaboration with other donor projects:	With TRIMMING/SPIN (WB) (large-scale irrigation), it aims for synergistic effects through co-financing or developing nearby agricultural infrastructure. It will also consider collaborating with ATASP-I (AfDB), which supports small-scale irrigation facilities, to complement the project in the vicinity.

Project name:	Rural roads improvement project
Project period	5 years
Implementing agency:	State Government
Scheme	Sector loan or Co-financing
Project Summary:	In rural areas, road networks are lacking or in poor condition, which not only increases the cost of distributing agricultural products, which is the main industry in rural areas, but also narrows the range of activities of local residents. In addition to agriculture, it is also a hindrance to education, medical care, and business, and if improvements were made, it would have a large impact on local residents. Road density in Nigeria is approximately 22 km/100 km². This is at a low level, less than one-sixth of India's road density of 142 km/100 km², which has a slightly lower gross national income per capita than Nigeria. (Nigeria; US\$ 2,100; India; US\$ 1,880). The RAI (Rural Access Index, percentage of people who have a road that is always passable within 2 km walking distance) is 25.5%, meaning that 3/4 of rural residents have poor access to the road network. Additionally, 87% of rural roads are said to be in poor condition, and improvements are required. State and rural roads are essentially under the jurisdiction of state governments, but many states do not have the structure or budget to develop, maintain, and manage rural roads. On the policy side, in the rural development section of the NDP (2021-2025), infrastructure development in rural areas, including roads, is positioned as important. The KPI in this section is to increase the length of rural roads by 20% by 2025. In addition, infrastructure development in rural areas is listed as one of the cross-cutting intervention measures in NATIP, and rural road development is mentioned along with irrigation, etc.
Utilization of JICA cooperation achievements:	Loss during transportation from farmers to markets is one of the bottlenecks when linking the achievements of SHEP to improving farmers' incomes, and this project will contribute to the development of the achievements of SHEP.
Collaboration with other donor projects:	Aim for synergistic effects through co-financing or developing nearby agricultural infrastructure.

Project name:	State post-harvest infrastructure development project
Project period:	5 years
Implementing agency:	State Government
Scheme	Sector loan or Co-financing
Project Summary:	Sector Loan. Nigeria has significant agricultural development potential but is constrained by low crop yields, high post-harvest losses (30%-50%), low value addition, and severe lack of infrastructure (particularly energy and transport). These hinder private sector investments to promote agricultural industrialization. As a result, locally produced food becomes less competitive and annual food import bills rise, contributing to high levels of poverty, unemployment and low levels of private investment in the agricultural industry. The unemployment rate in the fourth quarter of 2020 was high at 33.3% (22.2 million people) and is steadily increasing. The SAPZ program is aligned with NATIP 2021-2024 and National Livestock Transformation Plan (NLTP) 2019-2028 and will support the economic and social development of the Federal Government of Nigeria (FGN) and participating states. It will contribute to develop rural infrastructure, improve access to agricultural markets,

	increase agricultural productivity, adopt agricultural technologies, climate-smart agricultural production and processing, and increase value addition and agro-processing. It will also contribute to skills acquisition and job creation for all actors in the value chain, including smallholder farmers, women, and youth.
Utilization of JICA cooperation achievements:	This project will promote the development of post-harvest processing, storage, processing, and market facilities. By reducing post-harvest losses and increasing the added value that remains in the hands of farmers, it will contribute to the development of the achievements of SHEP and the expansion of the achievements of CARD projects.
Collaboration with other donor projects:	Aim for synergistic effects through co-financing or developing nearby agricultural infrastructure.

(3) Project proposals in other fields

For issues in the agricultural sector that are not covered by project proposals in the agricultural finance and agricultural infrastructure fields, project proposals in other fields are proposed.

Table 2-106 Project Proposals in Other Fields

Project	Addressing challenges in the agricultural sector		
	Production stage	Post-harvest processing stage and distribution at production areas stage	Distribution stage and Processing stage
Project to improve access to market information by pastoralists and reduce conflicts between pastoralists and farmers	- Promoting conflict prevention and security in rural areas - Promote investment and improve productivity by organizing nomadic farmers		Increasing the operating rate and added value of processing companies (especially improving procurement capacity in the dairy processing industry)
Human resources development to accelerate ecosystem of agricultural machineries:	Promoting investment in agricultural machinery and farmers' access to agricultural machinery services		
Project to promote development of superior varieties and improve seed production systems	Promotion of research, development and production of seeds, etc., and dissemination to farmers		

Source: Prepared by the Study Team

Project name:	Project to improve access to market information by pastoralists and reduce conflicts between pastoralists and farmers
Project period:	3 years (Coordination with stakeholders, Planning, Development of application: 2 years, Pilot project: 1 year)
Implementing agency:	FMAFS, NITDA
Scheme	Technical Assistance
Project Summary:	Because pastoralists are widely distributed and present, it is difficult for public agencies and traders to reach them, resulting in additional costs to ensure input supply, market access, etc. In addition, there are frequent conflicts between pastoralists and farmers over pasture and farmland, and the Federal government has considered measures to settle pastoralists, but has yet to implement them. This project will support pastoralists to obtain information on market price and supply-

	demand trend on livestock products by introducing an application, and to negotiate sales with market participants through chatting, etc. For market participants, GPS can be used to locate pastoralists and help facilitate access to them. It also uses GPS and AI to help governmental organizations and farmers predict the paths that pastoralists will take. This will improve access to market information by pastoralists, and in particular, the promotion of two-way information dissemination and communication between markets of livestock product and pastoralists will contribute to the diversification and stabilization of sales channels for pastoralists. In addition, by predicting in advance the paths that pastoralists will take, it will be possible to guide pastoralists and respond to them in advance, thereby contributing to reducing conflicts between pastoralists and farmers.
Utilization of JICA cooperation achievements:	Improving the production efficiency of pastoralists by tracing the movement routes of nomadic livestock using GPS and AI will also help reduce conflicts between pastoralists and farmers.
Collaboration with other donor projects:	This will be carried out in collaboration with the World Bank's Livestock Productivity and Resilience Support Project.

Project name :	Human resource development to accelerate ecosystem of agricultural machineries
Project period:	3 years
Implementing agency:	FMAFS, Agricultural Mechanics and Machinery Operators Training Center (AMMOTRAC), National Center for Agricultural Mechanization (NCAM)
Scheme	Technical Assistance
Project Summary:	In collaboration with AFICAT, we will support the development of human resources for operators and mechanics to spread agricultural machinery, and the introduction of a qualification system that will help ensure the quality of human resources.
Utilization of JICA cooperation achievements:	This project will contribute to widely disseminating the achievements of AFICAT and the CARD project by promoting agricultural mechanization.

Project name :	Project to promote development of superior varieties and improve seed production systems
Project period:	5 years
Implementing agency:	National Cereal Research Institute (NCRI), National Root Crop Research Institute (NRCRI), National Agricultural Seed Council (NASC)
Scheme	Program Loan, Technical Assistance
Project Summary:	Facilities and equipment that will contribute to the development of new superior varieties and the construction of appropriate seed production systems will be provided, and the capabilities of researchers at NCRI, NRCRI, and NASC will be strengthened. At the same time, the seed production monitoring capacity of NASC staff will be strengthened, and the production capacity of the seed production association will be strengthened.
Utilization of JICA cooperation achievements:	By promoting the development and production of superior varieties, this project will contribute to deepening the achievements of the CARD project and increasing benefits such as increases in farmer productivity and income through the development of SHEP.
Collaboration with other donor projects:	It will proceed in collaboration with IFAD's VCDP.

The table below summarizes the correspondence between the above-mentioned cooperation project proposals in the financial field, infrastructure field, and other fields, and the issues and their factors at each VC stage in the agricultural sector.

Table 2-107 Implementation schedule of proposed cooperation project and expected impact on agricultural VC

Category	Projects	Schedule										Impacts on issues of agricultural sector		
		Year 1-5					Year 6-10					Production	Post-harvest	Distribution, processing
Finance	TSL Project for agricultural sector											Stimulate investment of producers and suppliers	Stimulate private investment for post-harvest Promote linkage of farmers to commercial VC	Stimulate private investment of processors
	Reform of BOA and agricultural policy finance											Stimulate investment of producers		
	Pilot projects on DX of cooperatives											Promote organization of farmers	Promote linkage of farmers to commercial VC	
	Upgrading APEX system of agricultural and credit cooperatives											Strengthen functions of cooperatives		
Infrastructure	Irrigation development project											Strengthen production infrastructure	Develop storage and processing facilities	
	Irrigation agriculture promotion project											Improve operation and maintenance of irrigation facilities Facilitate needs for mechanization and investment on small scale irrigation		
	Rural roads improvement project												Improve quality of rural roads	
	State post-harvest infrastructure development project												Promote investment in primary processing and storage facilities Promote linkage of farmers to commercial VC	Improve operation of processing companies
Other	Project to improve access to market information by pastoralists and reduce conflicts between pastoralists and farmers											Mitigate conflict between pastoralists and farmers Organization of pastoralists for higher productivity		
	Human resources development to accelerate ecosystem of agricultural machineries:											Facilitate investment in machineries and farmers' access to mechanization		
	Project to promote development of superior varieties and improve seed production systems											Promote R&D and production of varieties Promote farmers' access to good varieties		

3 Current status and support measures on Agricultural finance

3.1 Farming status of farmers and financial challenges

3.1.1 Socioeconomic survey at rural area

Rural surveys aim at collecting a certain quantitative information about the actual conditions of farmers and farmer groups, agricultural production processes and challenges, livelihoods, recognition of finance and banking transactions, business outlines of local distributors and processors, market trade customs and conditions, etc. Those collected information will be aggregated and analyzed to examine funding needs and issues of producers and processors, etc., financial literacy, profitable investments and funding methods for that purpose, necessary capacity building and awareness activities, etc. This will serve as the basis for concrete consideration of cooperation projects in the field of agricultural finance.

Considering the budget and time constraints, the survey area was assumed to be up to 5 States in a contract with a local consultant who are assigned to implement a rural survey.

The study area was selected as follows.

(1) Evaluation of potentials of each commodities

For each commodities in the four categories such as cereals, vegetables, crops for processing, and aquaculture, weight that indicates the level of potential of each surveyed commodities was calculated as the average of the deviation values of the following six items¹²⁸ : (1) Gross profit of farmers, (2) Estimated value of total farm sales across the country, (3) Increase in total production when yields improved (based on assumptions explained in Chapter 1.0.2), (4) Increase in total farm sales in five years based on recent trends, (5) Imports Quantity divided by Supply Quantity from FAO's Food Balance (import substitution potential), (6) ComTrade-based export value (including processed goods).

¹²⁸ For livestock, State with a large number of livestock was selected.

Table 3-1 Calculation of potential weight of each commodities

Commodities	Gross profit of farmers (N/ha)	Deviation value of Gross profit	Aggregated sales (N million)	Deviation value of aggregated sales	Increase of production with target yield (K tons)	Deviation value of potential production	Increase of sales in 5 years (N million)	Deviation value of increase of sales in 5 years	Average of import to domestic supply ratio of the past 5 years (FAO)	Deviation value of average of import to domestic demand ratio	ComTrade: Export Ave. 2020-2021 (USD million)	Deviation value of export	Weighting of average deviation value
Rice	736,320	51	4,371,208	64	2,391	49	890,866	67	8.9%	49	1.3	47	1.087
Maize	317,168	47	3,300,955	58	1,062	47	533,983	57	3.0%	47	1.1	47	1.007
Sorghum	151,613	45	1,593,825	50	118	45		42	0.0%	46	0.3	46	0.915
Yam	416,642	48	5,894,149	71	14,662	65	1,040,766	72	0.0%	46	0	46	1.159
Cassava	311,679	46	5,357,667	68	32,534	90	218,014	48	0.0%	46	0.7	47	1.149
Millet	125,406	45	472,812	45	78	45	139,147	46	0.0%	46	0	46	0.909
Cocoyam	1,625,778	60	4,166,616	63	1,111	47		42	0.0%	46	0	46	1.010
Plantain	1,296,212	56	938,276	47	460	46	3,340	42	0.0%	46	0	46	0.944
Wheat	43,648	44	3,510	42	44	45	731	42	98.1%	83	0.6	47	1.011
Potatoes	261,750	46	170,364	43	3,059	50	8,663	42	1.0%	46	0.3	46	0.911
Soybeans	323,936	47	480,200	45	169	46	52,034	43	7.9%	49	3.9	47	0.919
Cowpea	225,599	46	1,897,764	52	602	46	744,984	63	0.0%	46	0.05	46	0.996
Tomatoes	288,394	46	464,876	45	5,662	53		42	10.0%	49	0.07	46	0.939
Okra	12,821	43	325,959	44	19,012	71	8,616	42	0.1%	46		46	0.976
Orange	150,551	45	431,760	45	3,614	50	830	42	0.0%	46	0.2	46	0.912
Sesame seed	346,474	47	233,200	44	58	45	108,739	45	0.1%	46	304.5	73.1	0.998
Ginger	1,635,050	60	192,076	43	271	46	164,637	46	1.4%	46	13.1	47.6	0.964
Cotton seed	144,435	45	59,290	43	121	46		42	4.9%	48	NA	#VALUE!	#VALUE!
Oil Palm	1,175,000	55	7,044,100	77	1,733	48		42	54.2%	66	0.1	46.5	1.113
Groundnuts	380,986	47	2,285,404	54	0	45	645,056	60	0.1%	46	0.1	46.5	0.995
Cocoa	483,944	48	294,000	44	126	46	32,020	43	0.0%	46	487.3	89.1	1.050
Hibiscus	373,910	47	23,800	43	7	45		42	NA	#VALUE!	6.8	47.1	#VALUE!
Cashew nuts	232,400	46	52,194	43	38	45		42	8.3%	49	147.2	59.4	0.946
Sugar cane	201,391	45	35,953	43	1,951	48		42	85.4%	78	0.0	46.5	1.009
Carfish	5,114,520	95	227,424	44	74	45		42	0.2%	46	0.1	46.5	1.058
Tilapia	914,900	53	87,360	43	15	45		42	0.2%	46	0.1	46.5	0.916

Source: Prepared by the survey team based on FAO STAT, APS, other literature, and data obtained through interviews.

(2) Priority Commodities

In order to select States to be surveyed, priority commodities should be selected first. In addition, when selecting farmers to be surveyed, the number of producers of these priority commodities should be set relatively large.

The survey target locations are assumed to be 2 villages for each of the 5 classification categories, totaling 10 villages, and the priority items to be surveyed in each village are selected. In principle, 2 items from each of the 5 categories will be selected from the items with the highest potential weights. However, as shown in the table below, the sales amount of aquaculture is small, and the production of items other than catfish is insignificant. Therefore only one item is chosen for aquaculture, while 3 items were selected for cereal.

Table 3-2 Sales value of 5 categories and selected commodities

Categories	Sales value (N million)	Priority commodities
Cereal	26,749,582	Yams, Cassava, Rice
Crops for processing	10,220,017	Cocoa, Sesame
Vegetables	3,120,359	Tomatoes*, Other vegetables (Cowpea)
Livestock	2,417,983	Cow, Poultry
Aquaculture	314,784	Catfish

Note: *Tomatoes were selected as a priority crop as many local stakeholders pointed out their importance.

(3) Selection of target States

By multiplying the data of the production volume by commodities in each State by the weight representing the aforementioned potential, the production volume with the potential weight is calculated.

After totaling the production volume with potential weight for each category of cereals, vegetables, crops for processing, and aquaculture, and narrowing down to 18 states with risk level 2, the top 7 states are selected as candidates. However, for vegetables, priority will be given to the top 7 provinces and SHEP target areas (See Table 3-10 "Data for selection of States").

In principle, the State with the highest production volume of the above priority commodities will be selected from among the 7 candidate States. If necessary, the selection refers to the results of Gender Inequality Index (GII), Multi-Dimensional Poverty Index (MPI), and ACGSF (guaranteed loan amount compared to total farm sales in the States) in each States.

Due to the limitation of a maximum of five States to be selected as previously mentioned, the selection proceeded with the selection in order of sales value: cereals, crops for processing, vegetables, livestock, and aquaculture.

Table 3-3 Procedure to select target States of priority commodities

Categories	Target States of priority commodities
Cereal	Rice : Benue, Cassava : Benue, Yams : Nasarawa
Crops for processing	Cocoa : Ondo, Sesame : Benue
Vegetables	Tomatoes : FCT, Cowpea : Benue*
Livestock	Cow : Nasarawa, Poultry : Oyo

Aquaculture	Catfish : Oyo**

Note: *First place is Taraba State, but Benue was selected as the second place due to safety concerns in the survey. **1st place Lagos and 2nd place Oyo, but Oyo was selected because of the close difference and not exceeding 5 States.

The above results are summarized in the table below.

Table 3-4 Priority commodities and target States

Target category	Grain			Vegetable		Crop for processing		Livestock		Fishery
	1 st Location	2 nd Location	3 rd Location	1 st Location	2 nd Location	1 st Location	2 nd Location	1 st Location	2 nd Location	1 st Location
Product	Rice	Yam	Cassava	Tomato	Other vegetables	Sesame	Cocoa	Cattle	Poultry	Cat fish
State	Benue	Nasarawa	Benue	FCT	Benue	Benue	Ondo	Nasarawa	Oyo	Oyo

Table 3-5 Data for selection of States

State	Zone	Gender Inequality Index (GII) 2016	Multi Dimensional Poverty Index (MPI)	ACGSF	SHEP	Cereal	Vegetables	Crops for processing	Aquaculture	Rice	Yam	Cassava	Cowpea	Tomatoes	Sesame seed	Cocoa	Catfish
Taraba	1 North East	0.86	0.281892	0.20%		5	7,342	466	301	19	433.0	3,920.1	1,675.7	257.0	185.4	50.6	5.1
Benue	2 North Central	0.64	0.165513	0.39%		2	9,505	263	436	7	577.5	3,608.9	4,295.7	138.1	72.4	95.7	0.0
FCT	2 North Central	0.522	0.174368	0.13%		1	6,802	422	316	0	463.0	3,557.6	2,103.4	127.5	267.0	58.4	0.0
Kwara	2 North Central	0.598	0.161384	0.37%		0	5,962	345	277	2	481.9	2,603.8	1,768.0	204.4	38.6	16.0	1.5
Nasarawa	2 North Central	0.701	0.237637	0.13%		1	8,211	163	335	0	465.6	4,922.0	2,077.0	90.5	54.8	61.8	0.0
Plateau	2 North Central	0.615	0.29196	0.23%		0	4,680	135	254	0	279.4	2,005.4	1,233.2	101.1	21.2	38.9	0.0
Abia	4 South East	0.555	0.164706	0.37%		0	5,275	245	59	2	65.0	2,761.1	1,829.9	47.2	180.6	0.0	3.5
Ebonyi	4 South East	0.504	0.248383	0.16%		5	6,220	209	107	0	162.6	3,554.3	28.6	43.5	75.7	0.0	0.0
Enugu	4 South East	0.479	0.150261	0.30%		0	7,364	231	71	0	105.1	3,922.6	2,534.7	86.1	60.4	0.0	0.0
Akwa Ibom	5 South South	0.507	0.244742	0.35%		0	4,641	199	155	17	26.8	2.9	2,118.4	42.4	127.4	0.0	1.3
C/Rivers	5 South South	0.586	0.159753	0.20%		2	6,907	148	207	1	182.4	3,512.9	2,646.5	23.9	89.5	0.0	72.4
Edo	5 South South	0.568	0.144214	0.66%		5	7,755	41	112	0	153.8	3,853.6	1,553.3	5.2	18.3	0.0	24.7
Lagos	6 South West	0.643	0.115275	0.16%		0	5,129	203	38	2	156.7	1,970.4	2,155.7	96.6	57.2	0.0	38.0
Ogun	6 South West	0.422	0.1023	1.15%		0	2,409	181	0	37	95.8	0.0	1,891.5	62.7	0.0	0.0	0.2
Ondo	6 South West	0.829	0.115106	0.92%		2	4,123	166	62	2	104.4	1,157.2	2,214.2	54.0	91.0	0.0	20.8
Ondo	6 South West	0.458	0.120314	0.19%		0	8,021	297	211	0	134.1	2,600.8	4,292.2	115.5	135.2	0.0	96.2
Osun	6 South West	0.849	0.062038	0.26%		5	5,973	266	135	39	129.2	2,899.5	2,195.4	87.2	156.0	0.0	77.3
Oyo	6 South West	0.531	0.152048	0.53%		0	4,684	357	101	34	121.2	1,912.2	2,099.0	101.6	212.9	0.0	37.6

Note: ACGSF: Ratio of accumulated guaranteed loan amount (N million) since 2001 divided by estimated annual sales of farmers. State values worse than the average for the Gender Inequality Index (GII) 2016, Multi-Dimensional Poverty Index (MPI), and ACGSF results (compared to state farm sales) are shaded in orange. The top 7 states for cereals, vegetables, crops for processing and aquaculture production (Unit: N million) are shaded in yellow. In addition, the production volume of the research target States by commodities is shaded in yellow.

Table 3-6 Population of livestock by States

State	Zone	Cattle	Sheep	Goats	Pig	Chicken	Total
Benue	2 North Central	131,370	858,484	4,663,109	1,196,073	3,531,637	10,531,165
FCT	2 North Central	32,723	205,922	1,057,669	32,585	2,725,834	4,106,216
Kwara	2 North Central	1,053,980	419,532	2,061,488		2,962,894	6,851,861
Nasarawa	2 North Central	1,431,243	1,076,479	1,859,775	338,055	4,283,512	9,946,732
Plateau	2 North Central	779,677	2,368,712	4,369,439	1,866,367	9,645,535	19,585,903
Taraba	2 North Central	324,023	1,169,845	1,158,925	350,788	7,841,314	11,837,060
Abia	4 South East		223,659	503,363	442,846	1,525,415	2,912,472
Ebonyi	4 South East	14,455	223,679	1,144,434		7,268,929	8,657,254
Enugu	4 South East	2,530	164,134	1,604,942	88,662	6,419,481	8,530,620
Akwa Ibom	5 South South		994,770	2,338,433	527,210	3,569,845	7,932,500
C/Rivers	5 South South		136,132	255,665	45,094	3,033,323	3,470,214
Edo	5 South South	133,456	638,874	1,379,285	22,976	5,114,710	7,528,211
Ekiti	6 South West	35,292	73,991	1,107,308	143,775	124,534	1,562,418
Lagos	6 South West			12,980	16,413	6,418,242	6,447,635
Ogun	6 South West	15,075	204,788	1,139,005	93,239	8,265,825	9,901,943
Ondo	6 South West	36,735	166,731	2,651,289	1,033,557	1,544,632	5,534,679
Osun	6 South West		684,678	4,270,965	210,938	3,285,253	8,461,296
Oyo	6 South West	62,476	727,064	3,452,653	276,542	13,505,237	18,213,588

Note: The top 7 states in terms of the total number of cattle, sheep, goats, pigs, and chickens raised as the 5 major items are shaded. In addition, the numbers of cattle and chickens raised in selected states, which are priority items, are shaded.

(4) Outline of survey item

In order to grasp the current situation of farmers, agriculture-related small and medium enterprises, farmers' organizations, markets and anchor firms, which are assumed to be major borrowers of TSL, a socioeconomic survey at rural area including the following survey items were conducted.

Table 3-7 List of main survey contents

Target	Contents	Main questions
Farmers	1. Basic information of farmers	Name of farmers
		Member composition of household
		Main source of income
		Borrowing from financial institutions
		Perception of finance/borrowing
		The status of farm land
		Size of the farm lands
	2. Information on cultivation techniques of farmer	Main cultivated crops
		Area size of cultivated land
		Agricultural machinery which is owned or leased; the number, type, use, original price and method of procurement of agricultural machinery, and owned or leased
	3. Information on farm management	Management of household account
		Yields of main crops/commodities
		Inputs and their costs on each crops
		Expenses on sales of harvested crops
		Mode of selling crops
		Experience of Contract farming or not, if yes, its details
		Financial performance in the past five years
		Taxation and general cost
	4. Needs for expansion of productivity	Needs for expanding agricultural production
		Expected amount of investment for the expansion of agricultural production mentioned above, and expected source of the finance
		Challenges for the expansion plan mentioned above
		Measures expected to be taken by financial institutions to address the challenges mentioned above
	5. Other information on farmers	Whether a farmer belongs to a farmer's organization/cooperative. If yes, the name of the organization and its main activities.
		Experience of empowerment activities and extension service in the field of agricultural/rural development finance over the past three years. If yes, Name of the organization that provided the activities.
		Experience of using and maintenance of agricultural machinery; Type of machinery, Purpose of using the machinery, Brand of the machinery, Any problems observed, Owner of the machinery, Mode of maintenance
Agriculture-related small and medium enterprises	1. Information on agriculture-related company	Year of establishment
		Number of employees
		Overview of business
		P/L: annual Sales, sales margin, cost of sales, administrative expenses, of which depreciation costs, profit before tax, tax, and net income after tax
		Debt status
		Challenges for business expansion including expected sources/means of finance
	2. Other information on agriculture business	Local Market; main items of crops/commodities and processed commodities which are traded, production areas of those

		crops/commodities/processed commodities, prices of each crops/commodities, trading practice, participating actors to the market, etc.
		The supply chain among farmers, middlemen, markets, retailers and exporters on typical agricultural products and processed agricultural products in the survey locations, and methods of collection, transportation and storage.
		Factors that influences the prices of the agricultural crops/commodities and processed agricultural products targeted in above: actors participating/near the market, including retailers, middlemen, and exporters. Factors influencing prices may include; e.g. variety, quality, size of sales lot, timing of shipping, package, etc.

Source: Survey team

As mentioned above, the states and the main items to be surveyed are shown in the table below. In each location, survey for 10 farmers, 10 agriculture-related SMEs, 2 farmers' organizations, 1 market, and 1 to 3 anchor firms were conducted.

Table 3-8 Number of surveys conducted (by commodities, by state and by targets)

Target category		Grain			Vegetable		Crop for processing		Livestock		Fishery
		1 st Location	2 nd Location	3 rd Location	1 st Location	2 nd Location	1 st Location	2 nd Location	1 st Location	2 nd Location	1 st Location
Product		Rice	Yam	Cassava	Tomato	Other vegetables	Sesame	Cocoa	Cattle	Poultry	Cat fish
State		Benue	Nasarawa	Benue	FCT	Benue	Benue	Ondo	Nasarawa	Oyo	Oyo
Farmer	Small scale farmer (Male head of household)	6	6	6	6	6	6	6	6	6	6
	Small scale farmer (Female head of household)	2	2	2	2	2	2	2	2	2	2
	Middle or Large scale farmer	2	2	2	2	2	2	2	2	2	2
	Total	10	10	10	10	10	10	10	10	10	10
MSMEs	Supplier, Buyer, Primary Processor, Producer	10	10	10	10	10	10	10	10	10	10
	Total	10	10	10	10	10	10	10	10	10	10
Farmer organization		2			2		2		2		2
Local market		1			1		1		1		1
Anchor firm		1 - 3			1 - 3		1 - 3		1 - 3		1 - 3
Total per item		64 - 66			44 - 46		44 - 46		44 - 46		24 - 26
Total 5 items		220 - 230									

Note: The ratio of female farmers varies by state, but in general it is between 10% and 30% through all the states.

Source: Survey team

In the next section, farming status of farmers and financial challenges are discussed, based on the survey results.

3.1.2 Crop farmer

The total number of target crop farmers is 70, and the number of samples categorized by size of farmland area and farm income is shown in the table below. In terms of classification about farmland area, 47% of the respondents have less than 4 ha, and 23% of them have 8 ha or above.

Table 3-9 Number of target farmers categorized by size of farmland area and farm income

(Unit: Number of respondents)

Farm income class(N million) Farm area class (ha)	<0.3	0.3≤<0.5	0.5≤<1.5	≤1.5<3	3≤	Total	%share
<2	1	3	1	1	2	8	11%
2≤ <3	1	6	4	2	1	14	20%
3≤ <4	1	1	5	2	2	11	16%
4≤ <8	5	3	5	7	1	21	30%
8≤	3	1	2	2	8	16	23%
Total	11	14	17	14	14	70	100%
%share	16%	20%	24%	20%	20%	100%	

Source: Survey team

(1) Commercial literacy and Investment intentions

For the targeted 70 farmers, 9% of them have financial records, 17% of them have farmland registration, and 31% of them participate in farmer groups. Comparing farmers who are willing to invest with those who are not, those who participate in the group and those who have financial records tend to be more willing to invest.

Table 3-10 Commercial literacy and investment intentions

(Unit: Percentage of respondents on Yes)

Commercial literacy Intend to invest	Financial record	Register title deed	Belong to group	Total sample
Not intend to Invest	3%	37%	13%	30
Intend to invest	13%	3%	45%	40
Total	9%	17%	31%	70

Source: Survey team

The table below shows the respondents' experience in contracting with buyer (e.g., receiving assistance, obligation to sell, etc.). 40% of the respondents had experience with assistance in arranging seeds, 9% with technical advice, 31% with daily monitoring of farming operations, 20% with whole purchase, and 1% with prohibition of side selling. Of these, investment intentions are higher among those with experience of whole purchase than among those without.

Table 3-11 Experience in contracting with buyer and investment intentions

(Unit: Percentage of respondents on Yes)

Contract experience	Seed arranged	Technical advice	Day to day monitoring	Purchase all goods	Prohibition of side sell	Total sample
Not intend to Invest	60%	10%	37%	13%	0%	30
Intend to invest	25%	8%	28%	25%	3%	40
Total	40%	9%	31%	20%	1%	70

Source: Survey team

The table below shows the percentage of respondents with investment intentions by size of farmland area. The investment intention tends to be particularly strong among small scale farmers who have less than 3ha of farmland area. This is thought to be due to the fact that although this category of farmers can expect a large increase in production through additional investment in high-quality input materials, it is difficult for them to invest due to limited accumulation of capital and access to loans.

Table 3-12 Category of size of farmland area and Investment intentions

(Unit: Number of respondents, Percentage of respondents)

Farm area (ha)	<2	2≤ <3	3≤ <4	4≤ <8	8≤	Total
Total sample	8	14	11	21	16	70
Intend to invest (number)	7	10	4	11	8	40
Intend to invest (ratio)	88%	71%	36%	52%	50%	57%

Source: Survey team

On the other hand, by agricultural income category, there is no noticeable difference in investment intention, but the investment intention is slightly higher in the N1.5 million to N3 million category, and the investment intention is lower in the less than N0.3 million category. This may imply that It is difficult to secure own funds for investment without a certain level of income.

Table 3-13 Category of agricultural income and Investment intentions

(Unit: Number of respondents, Percentage of respondents)

Farm income (N Million)	<0.3	0.3≤ 0.5	0.5≤ < 1.5	≤1.5 < 3	3≤	Total
Total sample	11	14	17	14	14	70
Intend to invest (number)	4	8	10	10	8	40
Intend to invest (ratio)	36%	57%	59%	71%	57%	57%

Source: Survey team

(2) Financial literacy and Investment intentions

The table below shows the responses regarding the utilized financial products. The savings account ownership rate is high at 74%, and the number of accounts in Nigeria is higher than in neighboring countries in the international comparison identified in Chapter 2.2.5, likely the result of a functioning traditional financial inclusion infrastructure, such as POS agents and BVN. Conversely, the use of mobile money and digital applications are limited. The utilization of loans from financial institutions is zero in the responses, but two farmers had utilized them in the past. In relation to investment intentions, it tends to be higher among users of financial products.

Table 3-14 Utilized financial products and Investment intentions

(Unit: Percentage of respondents)

Intend to invest	Savin g accou nt	Remittan ce at bank account	Remittan ce by POS agent	Saving account through cooperativ e's arrangeme nt	Digital apps for saving and remittan ce	Borrowi ng from financial institutio ns	Mobil e mone y	Total sampl es
Not intend to Invest	47%	0%	33%	0%	0%	0%	3%	30
Intend to invest	95%	18%	45%	0%	8%	0%	0%	40
Total	74%	10%	40%	0%	4%	0%	1%	70

Source: Survey team

The two farmers who have borrowing experience are farmers who produce cocoa and oil palm and have borrowed money from commercial banks to purchase agricultural machinery and equipment.

Table 3-15 Profile of farmers who have borrowing experience

Profile					Borrowing experience						
	Produ ct	Farm size (ha)	Agric. revenue (N)	Non- agric income (N)	Lender	Purpose	Time of borro wing	Amoun t (N)	Tenor (mont hs)	Intere st rate	Collat eral
Farmer A	Cocoa , Oil palm	8	NA	NA	Spring bank	machin ery and equipm ent	2003	500,000	NA	NA	None
Farmer B	Cocoa	4	100,000	300,000	First Bank	machin ery and equipm ent	2022	250,000	6	NA	None

Source: Survey team

Neither of them has registered their farmland, nor do they keep any books. They are aware of NAIC and NIRSAL because of their borrowing experience. High interest rates are cited as an issue with borrowing. They also replied that they had no intention to invest.

Table 3-16 Financial and commercial literacy of farmers who have borrowing experience

	Register title deed	Financial record	Recognize NAIC/NIRSAL	Difficulty of borrowing: High interest rate	Intend to invest
Farmer A	No	No	Yes	Yes	No
Farmer B	No	No	Yes	Yes	No

Source: Survey team

The next table shows responses regarding awareness of single-digit interest rate loan products, agricultural credit guarantees, and agricultural credit insurance. Overall, less than half of the farmers are aware of the financial products. For farmers with investment intentions, more than half are aware of single-digit interest rate loan products and agricultural credit guarantees.

Table 3-17 Awareness for concessional financial products and Investment intentions

(Unit: Percentage of respondents)

Intend to invest	Single digit loan program by CBN	Single digit loan program by BOA BOI DBN	Single digit loan program by SG or LG	Credit guarantee by CBN or NIRSAL	Agricultural insurance supported by NAIC	Total samples
Not intend to Invest	10%	7%	3%	0%	37%	30
Intend to invest	58%	65%	30%	73%	10%	40
Total	37%	40%	19%	41%	21%	70

Source: Survey team

The following table shows responses regarding awareness of organizations providing agricultural loans. MFB and commercial bank have high recognition, followed by DFI and credit cooperative. In general, the awareness of farmers with investment intentions is high.

Table 3-18 Awareness of the organizations providing agricultural loans and Investment intentions

(Unit: Percentage of respondents)

Intend to invest	DFI	Commercial banks	MFB	Credit cooperative	Aggregator or finance	ICT Company	Total samples
Not intend to Invest	3%	27%	40%	10%	0%	0%	30
Intend to invest	58%	73%	70%	33%	3%	0%	40
Total	34%	53%	57%	23%	1%	0%	70

Source: Survey team

(3) Investment plans and Challenges

The following section examines the investment plans of farmers who intend to invest and the financial challenges that they face.

The table below shows the investment amount and financing method (number of respondents with multiple responses) by investment purpose (acquisition of farmland, expansion of crop area, acquisition of agricultural machinery, increased input of agricultural materials such as seeds and fertilizers, input of higher quality seeds and fertilizers, and marketing facilities).

Table 3-19 Investment amounts and financing methods by investment purpose

(Unit: Number of respondents, Naira)

Investment purpose	Own fund	Borrowing from financial institutions	Borrowing from relatives/friends	Total amount	Average amount
01_Acquire farmland	2	8	1	20,300,008	2,255,556
02_Expand cultivation area within the farm	6	10	5	296,500,007	19,766,667
03_Acquire machineries	20	8	12	62,700,000	2,726,087
04_Expand purchase of seed and input	11	11	9	51,802,000	2,466,762

05_Purchase better seed and input	5	7	0	8,280,000	1,182,857
06 Expand sales outlet	0	2	0	1,030,000	515,000
Total	44	46	27	440,612,015	28,912,930

Source: Survey team

Both the total and average investment amounts are large for the expansion of cultivation area within the farm, acquisition of agricultural machineries, and expanding purchase of seed and input. Own fund accounts for a large proportion of the total investment for acquisition of agricultural machineries, while borrowing from financial institutions accounts for a large proportion of the total investment for the expansion of cultivation area within the farm. The purchase of agricultural machinery has a long investment payback period (about 5 years), which is thought to be the reason why many respondents use their own funds. Overall, the financing methods, in terms of the number of responses, are financial institutions, own fund, and relatives/friends, in that order.

Next, responses regarding the reasons why borrowing from a financial institution is perceived to be difficult are examined.

Regarding the reasons for difficulty in borrowing, the following options were set: No hope to be approved, Insufficient collateral assets, Farm land not eligible for collateral, High interest rates, Difficulty in preparing document for application, Fear of not being able to repay the loan, and non-availability of non-interest finance products (Islamic finance) .

Overall, respondents mentioned high interest rate, no hope, and collateral assets, in that order. For farmers with investment intentions, the most common responses are high interest rate, collateral, and no hope, in that order, with little or no fear of not being able to repay. On the other hand, farmers with no intention to invest are more likely to indicate high interest rate and fear of non-payment. Farmers who are considering specific investment plans seem to have some confidence in their ability to repay the loan.

Table 3-20 Reasons for difficulty in borrowing from financial institutions

(Unit: Percentage of Respondents)

Intend to invest	No hope to be approved	Collateral asset	Farm land not eligible for collateral	High interest rate	Documentation for application	Fear of not being able to repay	Non availability of non-interest finance	Total samples
Not intend to Invest	17%	3%	0%	47%	7%	23%	0%	30
Intend to invest	58%	60%	18%	68%	50%	5%	0%	40
Total	40%	36%	10%	59%	31%	13%	0%	70

Source: Survey team

Finally, the conditions that are important to farmers when borrowing from financial institutions is examined. The following table shows the number of multiple responses about each investment purpose by farmers who intend to invest. For the investment as a whole, the most important criteria are grace

period, repayment period, and interest rate, in that order. It is thought that many farmers are paying close attention to dealing with cash flows specific to agriculture, such as the timing of inputs and harvesting.

Table 3-21 Conditions that are important to farmers when borrowing from financial institutions

(Unit: Number of respondents)

	Payme nt period	Grace period	Intere st rate	collater al apprais al	Credit guarant ee	Financi al advice	Assistance for documentati on	Assistan ce to register farmlan d title
01_Acquire farmland	7	7	6	6	5	2	2	0
02_Expand cultivation area within the farm	9	15	9	5	5	4	4	1
03_Acquire machineries	10	19	6	2	3	2	2	2
04_Expand purchase of seed and input	10	19	12	7	9	5	5	0
05_Purchase better seed and input	4	7	4	2	3	6	6	0
06_Expand sales outlet	1	2	0	0	0	0	0	0
Total	41	69	37	22	25	19	19	3

Source: Survey team

(4) Hypothesis of stage-up for crop farmers

Based on the results of the above consideration, the pattern of stage-up of crop farmers is examined. Regarding commercial literacy in terms of bookkeeping, experience with contracts of purchasing all goods, and farmland registration, 9% of all farmers have bookkeeping, 20% have experience with contracts of purchasing all goods, and 17% have farmland registration. From the view point of group participation, farmers who participated in the group are more likely than those who did not participate to have a bookkeeping documents and experience in contracts of purchasing all goods¹²⁹.

Table 3-22 Participation in a group and commercial literacy

(Unit: Percentage of Respondents)

Commercial literacy	Have financial record	Sell all products	Register title deed	Total
Belong to group				
Not belong to group	6%	19%	21%	69%
Belong to group	14%	23%	9%	31%
Total	9%	20%	17%	

Source: Survey team

Next, regarding at the relationship between participation to a group and financial literacy, overall, 74% have a savings account, 40% experience remittance transactions through POS, 40% are aware of single digit loan products through DFI, and 53% are aware of commercial banks. In all of these categories, the percentage of recognition by farmers participating in the group is higher.

¹²⁹ The percentage of farmland with registration is lower among farmers participating in the group. As for reasons for not registering farmland, overall, 40% of respondents answer that they cannot afford the fees and 29% of them answer that they do not know about farmland registration. Other reasons answered by the majority of respondents are that it is family land and that no document is prepared.

Table 3-23 Participation in a group and financial literacy

(Unit: Percentage of Respondents)

Financial literacy	Saving account	Remittance by POS agent	Recognize single digit loan of BAO BOI DBN	Recognize commercial banks
Belong to group				
Not belong to group	63%	33%	33%	42%
Belong to group	100%	55%	55%	77%
Total	74%	40%	40%	53%

Source: Survey team

Furthermore, concerning at financial literacy responses by whether the farmers have experience with contracts of selling all products, which differed significantly by investment intention among those with experience with contract transactions, the ratio of experience and awareness is higher among farmers with experience in contract with selling all products in all categories.

Table 3-24 Experience in contract with whole purchase and financial literacy

(Unit: Percentage of Respondents)

Financial literacy	Saving account	Remittance by POS agent	Recognize single digit loan of BAO BOI DBN	Recognize commercial banks
Commercial contract				
No Experience of contact: sell all products	75%	38%	34%	48%
Experience of contact: sell all products	71%	50%	64%	71%
Total	74%	40%	40%	53%

Source: Survey team

In light of the above results, participation in group or contract cultivation is related to commercial literacy, which is also related to higher financial literacy. Furthermore, higher financial literacy is also related to investment intentions. Therefore, it would be effective to provide timely support for farmers to stage up like, (1) through participation to group and contract in agricultural VC, (2) deepen their knowledge and experience in commercial transactions and finance, and (3) plan to invest with a certain degree of confidence.

3.1.3 Livestock farmer (Cattle)

The total number of target livestock farmers is 10, and the number of samples categorized by number of rearing cattle and livestock income is shown in the table below. The largest number of livestock farmers are categorized as having between 50 and 100 heads of cattle, and between N2.5 million and N5 million in terms of livestock income.

Table 3-25 Number of target farmers categorized by number of rearing cattle and livestock income
(Unit: Respondent)

Livestock income class (N million)	< 2.5	2.5 ≤ <5.0	5.0 ≤	Total	%share
Number of cattle class (Heads)					
< 50	0	4	0	4	40%
50 ≤ < 100	1	4	0	5	50%
100 ≤	0	0	1	1	10%
Total	1	8	1	10	100%
%share	10%	80%	10%	100%	

Source: Created by the Survey team

(1) Commercial literacy and Investment intentions

The table below shows the percentage of respondents with investment intentions by number of rearing cattle. The investment intention tends to be particularly strong among farmers who raise “50 to 100 heads” and “more than 100 heads” of cattle.

Table 3-26 Category of number of rearing cattle and Investment intentions
(Unit: Respondent, Percentage of Respondents)

Number of cattle class (Heads)	< 50	50 ≤ < 100	100 ≤	Total
Total sample	4	5	1	10
Intend to invest (Number of sample)	3	5	1	9
Intend to invest (%)	75%	100%	100%	90%

Source: Created by the Survey team

The following is the percentage of respondents with investment intentions by category of livestock income. In particular, farmers with income of “less than N2.4 million” and “more than N5 million” tended to have strong investment intentions.

Table 3-27 Category of livestock income and Investment intentions
(Unit: Respondent, Percentage of Respondents)

Livestock income (N million)	< 2.5	2.5 ≤ <5.0	5.0 ≤	Total
Total sample	1	8	1	10
Intend to invest (Number of sample)	1	7	1	9
Intend to invest (%)	100%	88%	100%	90%

Source: Created by the Survey team

(2) Financial literacy and Investment intentions

The table below shows the responses about the financial products that respondents utilize. The savings account ownership rate is low at 10%, and no other financial products are utilized. In relation to investment intentions, investment intentions tend to be stronger among savings account holders.

Table 3-28 Utilized financial products and Investment intentions

(Unit: Percentage of Respondents)

Financial product	Savin g accou nt	Remittan ce at bank account	Remittan ce by POS agent	Saving account through cooperativ e's arrangeme nt	Digital apps for saving and remittan ce	Borrowi ng from financial institutio ns	Mobil e mone y	Total sampl es
Not intend to Invest	0%	0%	0%	0%	0%	0%	0%	1
Intend to invest	11%	0%	0%	0%	0%	0%	0%	9
Total	10%	0%	0%	0%	0%	0%	0%	10

Source: Created by the Survey team

The next table shows responses regarding awareness of single-digit interest rate loan products, agricultural credit guarantees, and agricultural credit insurance. None of the financial products were recognized, regardless of investment intentions.

Table 3-29 Awareness for concessional financial products and investment intentions

(Unit: Percentage of Respondents)

Concessional financial product	Single digit loan program by CBN	Single digit loan program by BOA BOI DBN	Single digit loan program by SG or LG	Credit guarantee by CBN or NIRSAL	Agricultural insurance supported by NAIC	Total samples
Not intend to Invest	0%	0%	0%	0%	0%	1
Intend to invest	0%	0%	0%	0%	0%	9
Total	0%	0%	0%	0%	0%	10

Source: Created by the Survey team

The following table shows responses regarding awareness of organizations providing agricultural loans. Regardless of investment intentions, none of the organizations providing agricultural loans were recognized.

Table 3-30 Awareness of the organizations providing agricultural loans and investment intentions

(Unit: Percentage of Respondents)

Organizations providing agricultural loan	DFI	Commerci al banks	MFB	Credit cooperati ve	Aggregat or finance	ICT Compan y	Total sampl es
Not intend to Invest	0%	0%	0%	0%	0%	0%	1
Intend to invest	0%	0%	0%	0%	0%	0%	9
Total	0%	0%	0%	0%	0%	0%	10

Source: Created by the Survey team

(3) Investment plans and Challenges

The following section examines the investment plans of farmers who intend to invest and the financial challenges that they face.

The table below shows the investment amount and financing method (number of respondents with

multiple responses) by investment purpose.

Table 3-31 Investment amounts and financing methods by investment purpose

(Unit: Respondent, Naira)

Investment purpose	Own fund	Borrowing from financial institutions	Borrowing from relatives/friends	Total amount	Average amount
01_Construction of cattle barn	0	0	0	NA	NA
02_Acquire land for cattle barn	0	0	0	NA	NA
03_Expand land for cattle barn	0	0	0	NA	NA
04_Acquire machineries	0	0	0	NA	NA
05_Expand purchase of calves and input	7	0	0	18,100,000	2,585,714
06_Purchase better variety of calves and inputs	1	0	0	NA	NA
07_Expand sales outlet	1	0	0	2,800,000	2,800,000
08_Social media and digital marketing	0	0	0	NA	NA
Total	9	0	0	20,900,000	5,385,714

Source: Created by the Survey team

The total investment amount is largely for the expansion of purchase on calves and inputs, while the average investment amount is largely for the expansion of sales outlet. Both the expansion of purchase on calves and inputs and the expansion of sales outlet are investments with own fund.

Finally, the conditions that are important to farmers when borrowing from financial institutions is examined. The following tables shows the number of multiple responses about each investment purpose by farmers who intend to invest. Regarding investment as a whole, the most important condition is the payment period.

Table 3-32 Conditions that are important to farmers when borrowing from financial institutions

(Unit: Respondent)

Conditions that are important when borrowing	Payment period	Grace period	Interest rate	collateral appraisal	Credit guarantee	Financial advice	Assistance for documentation	Assistance to register farmland title
01_Construction of cattle barn	0	0	0	0	0	0	0	0
02_Acquire land for cattle barn	0	0	0	0	0	0	0	0
03_Expand land for cattle barn	0	0	0	0	0	0	0	0
04_Acquire machineries	0	0	0	0	0	0	0	0
05_Expand purchase of calves and input	1	0	0	0	0	0	0	0
06_Purchase better variety of calves and	0	0	0	0	0	0	0	0

input								
07_Expand sales outlet	0	0	0	0	0	0	0	0
08 Social media and digital marketing	0	0	0	0	0	0	0	0
Total	1	0	0	0	0	0	0	0

Source: Created by the Survey team

(4) Hypothesis of stage-up for livestock farmers

Based on the results of the above consideration, the pattern of stage-up of livestock farmers is examined.

Although livestock farmers are willing to invest, they are limited to investments with their own funds because they have rarely utilized banking services and are unaware of financial products or institutions that provide agricultural loans. One possible reason for the low awareness of financial products and institutions that provide agricultural loans is the lack of organization among farmers. None of the 10 farmers surveyed were members of farmer organizations, thus limiting their access to information about loans and financial institutions and opportunities to share information from those with experience in borrowing. In addition, four of the ten farmers answered that they were not interested in financial products, implying that they may not be aware of the benefits of using financial products.

In light of the above, it seems necessary in staging livestock farmers to first improve their financial literacy to promote their understanding of financial products and financial institutions in parallel with supporting farmers organize. Then, after they have gained knowledge about finance and the benefits of taking out loans, long-term and low-interest financial products through TSL will be provided.

3.1.4 Poultry farmer

The total number of target poultry farmers is 10, and the number of samples categorized by the number of rearing birds and poultry income is shown in the table below. The largest number of poultry farmers are classified in the 500 to 1,000 birds raised category, and in the N5 million to N10 million category in terms of poultry income.

Table 3-33 Number of target farmers categorized by number of rearing birds and poultry income
(Unit: Respondent)

Poultry income class (N million)	< 5.0	5.0 ≤ < 10	10 ≤	Total	%share
Number of bird class (bird)					
< 500	2	0	0	2	20%
500 ≤ < 1,000	2	0	0	2	20%
1,000 ≤ < 2,000	0	2	0	2	20%
2,000 ≤ < 5,000	0	2	1	3	30%
5,000 ≤	0	1	0	1	10%
Total	4	5	1	10	100%
%share	40%	50%	10%	100%	

Source: Created by the Survey team

(1) Commercial literacy and size of poultry farmer

For the targeted 10 farmers, 40% of them have financial records, 70% of them have farmland registration, and 30% of them participate in farmer groups. Comparing small scale farmers with medium/large scale farmers, medium/large scale farmers are more likely to have financial records, register their farmland, and participate in farmer groups.

Table 3-34 Commercial literacy and size of poultry farmer

(Unit: Percentage of respondents on Yes)

Commercial literacy	Financial record	Register title deed	Belong to group	Total sample
Small scale poultry farmer	25%	50%	25%	4
Middle and Large scale poultry farmer	50%	83%	33%	6
Total	40%	70%	30%	10

Source: Created by the Survey team

The table below shows the respondents' experience in contracting with the marketing partner (e.g., receiving assistance, obligation to sell, etc.). 50% of the respondents had experience with assistance in arranging chicks, 50% with assistance in arranging other inputs, 60% with technical advice, 50% with daily monitoring of farming operations, 70% with whole purchase, and 60% with prohibition of side selling. Of these, small farmers had a higher percentage of contracted experience for assistance in arranging other inputs and technical advice.

Table 3-35 Experience in contracting with marketing partner and size of poultry farmer

(Unit: Percentage of respondents on Yes)

Contract experience	Chick arranged	Other input arranged	Technical advice	Day to day monitoring	Purchase all products	Prohibition of side sell	Total sample
Small scale poultry farmer	25%	75%	75%	50%	50%	50%	4
Middle and Large scale poultry farmer	67%	33%	50%	50%	83%	67%	6
Total	50%	50%	60%	50%	70%	60%	10

Source: Created by the Survey team

(2) Financial literacy and size of poultry farmer

The table below shows the responses regarding the utilized financial products. Overall, a high percentage of respondents utilize savings accounts, money transfers via POS agents, and mobile money. On the other hand, borrowing from financial institutions is limited. By size of poultry farmer, medium/large scale farmers are more likely to utilize financial products.

Table 3-36 Utilized financial products and size of poultry farmer

(Unit: Percentage of respondents)

Intend to invest	Saving account	Remittance at bank account	Remittance by POS agent	Saving account through cooperative's arrangement	Digital apps for saving and remittance	Borrowing from financial institutions	Mobile money	Total samples
Small scale poultry farmer	100%	50%	100%	50%	25%	0%	75%	4
Middle and Large scale poultry farmer	100%	67%	100%	50%	67%	50%	100%	6
Total	100%	60%	100%	50%	50%	30%	90%	10

Source: Created by the Survey team

The next table shows responses regarding awareness of single-digit interest rate loan products, agricultural credit guarantees, and agricultural credit insurance. Overall, there is awareness of single-digit interest rate loan products by CBN, but not much awareness of other credit guarantees and credit insurance. By size of poultry farmer, medium/large scale farmers have higher overall awareness of the agricultural credit guarantee, while small-scale scale farmers are aware of the agricultural credit guarantee, but medium/large scale farmers are not.

Table 3-37 Awareness for concessional financial products and size of poultry farmer

(Unit: Percentage of Respondents)

Intend to invest	Single digit loan program by CBN	Single digit loan program by BOA BOI DBN	Single digit loan program by SG or LG	Credit guarantee by CBN or NIRSAL	Agricultural insurance supported by NAIC	Total samples
Small scale poultry farmer	75%	0%	0%	50%	25%	4
Middle and Large scale poultry farmer	83%	0%	17%	0%	50%	6
Total	80%	0%	10%	20%	40%	10

Source: Created by the Survey team

The following table shows responses regarding awareness of organizations providing agricultural loans. Awareness of MFBs and commercial banks is high, followed by credit cooperative. In general, medium/large scale farmers are more aware of organizations providing agricultural loans, but 100% awareness of MFBs is reported for small scale farmers.

Table 3-38 Awareness of the organizations providing agricultural loans and size of poultry farmer

(Unit: Percentage of Respondents)

Intend to invest	DFI	Commercial banks	MFB	Credit cooperative	Aggregator finance	ICT Company	Total samples
Small scale poultry farmer	0%	75%	100%	50%	0%	0%	4
Middle and Large scale	0%	83%	67%	67%	17%	0%	6

poultry farmer							
Total	0%	80%	80%	60%	10%	0%	10

Source: Created by the Survey team

(3) Investment plans and Challenges

The following section examines the investment plans of farmers and the financial challenges that they face.

The table below shows the investment amount and financing method (number of respondents with multiple responses) by investment purpose.

Table 3-39 Investment amounts and financing methods by investment purpose

(Unit: Respondent, Naira)

Investment purpose	Own fund	Borrowing from financial institutions	Borrowing from relatives/friends	Total amount	Average amount
01_Construction of facility for hatchery	2	2	1	60,000,000	30,000,000
02_Construction of brooding facility for chicks	2	0	2	4,000,000	2,000,000
03_Construction of poultry house	2	0	1	40,000,000	20,000,000
04_Construction of slaughter and dressing facility	1	1	0	4,500,000	4,500,000
05_Acquire land for poultry house	2	0	0	22,500,000	11,250,000
06_Expand land for poultry house	3	0	4	56,250,000	14,062,500
07_Expand purchase of chick and input	7	0	5	72,200,000	10,314,286
08_Purchase better variety of chick and input	1	0	0	5,400,000	5,400,000
09_Expand sales outlet	1	0	0	1,250,000	1,250,000
Total	21	3	13	266,100,000	12,095,455

Source: Created by the Survey team

The total amount of investment is larger for the expansion of purchasing chick and input, while the average amount of investment is larger for the construction of facilities of hatchery. In terms of financing, own fund and borrowing from relatives/friends are the most common financing methods, while borrowing from financial institutions is only for the construction of facilities of hatchery and the construction of slaughter and dressing facility.

Next, responses regarding the reasons why borrowing from a financial institution is perceived to be difficult are examined.

Overall, all respondents answered “Yes” to high interest rates and fear of not being able to repay the loan. In addition to the above two reasons, all respondents answered "Yes" to the question about collateral asset for small scale farmers, suggesting that they have more difficulty in borrowing from financial institutions compared to medium and large scale farmers.

Table 3-40 Reasons for difficulty in borrowing from financial institutions

(Unit: Percentage of Respondents)

Investment purpose	No hope to be approved	Collateral asset	Farm land not eligible for collateral	High interest rate	Documentation for application	Fear of not being able to repay	Non availability of non-interest finance	Total samples
Small scale poultry farmer	75%	100%	50%	100%	50%	100%	25%	4
Middle and Large scale poultry farmer	50%	50%	33%	100%	50%	100%	50%	6
Total	60%	70%	40%	100%	50%	100%	40%	10

Source: Created by the Survey team

Finally, the conditions that are important to farmer when borrowing from financial institutions is examined. This is the number of multiple responses by small scale farmers for each investment purpose. Overall, the most important conditions for investment are financial advice, assistance for documentation, and repayment period/interest rate, in that order. In addition, financial advice is the most important result, which may indicate that although the farmers have no problems with production technology, they are concerned about their ability in terms of finance, and therefore it is necessary to improve the financial literacy of poultry farmers through training and other means.

Table 3-41 Conditions that are important to farmers when borrowing from financial institutions

(Unit: Respondent)

Conditions that are important when borrowing	Payment period	Grace period	Interest rate	collateral appraisal	Credit guarantee	Financial advice	Assistance for documentation	Assistance to register farmland title
01_Construction of facility for hatchery	1	0	1	0	0	0	0	0
02_Construction of poultry house	2	0	0	1	1	1	1	0
03_Expand land for poultry house	0	0	0	0	0	1	1	0
04_Expand purchase of chick and input	0	1	2	0	1	3	2	0
Total	3	1	3	1	2	5	4	0

Source: Created by the Survey team

(4) Hypothesis of stage-up for poultry farmer

Based on the results of the above consideration, the pattern of stage-up of poultry farmer is examined. Poultry farmers are willing to invest and use many financial tools such as savings accounts, remittances via POS agents, and use of mobile money, but borrowing from financial institutions is limited. Reasons for this include high interest rates, fear of not being able to repay, and lack of collateral assets, but also

the problem of small scale farmers themselves, as only 25% of them who responded to the rural survey keep financial records. Therefore, it would be important to increase the capacity of small scale farmers, mainly in the area of finance, by providing financial literacy education in parallel with the implementation of the TSL, leading to the utilization of the TSL.

3.1.5 Fishery farmer (Aquaculture)

In this study, 10 aquaculture farmers were targeted: 9 were catfish farmers and 1 was a tilapia farmer, of which 6 were hatchery operators and 4 were aquaculture operators.

Table 3-42 Number of farmers by business by aquaculture commodity

(Unit: Respondent)

Commodity Type of business	Catfish		Tilapia	
	Hatchery	Cultivation	Hatchery	Cultivation
Number of farmers	5	4	1	0

Source: Survey team

(1) Commercial literacy and investment intentions

In targeted farmers, 10 farmers (100%) keep books, 0 farmers (0%) have their land registered (right of occupancy), and 4 farmers (40%) participate in farmer groups. As for the investment intentions of the target farmers, all farmers indicate that they are willing to invest. Regarding the amount of investment, it is defined that more than N 1 million as "high investment intention" and less than N 1 million as "medium investment intention". Comparing farmers with high investment intention and medium investment intention, there was no significant difference between the groups, both groups keep good books, but they do not register their farmland, and about 30% to 40% of the farmers belong to the farmer group.

Table 3-43 Commercial literacy and investment intentions

(Unit: "yes" answered ratio)

Commercial literacy Intend to invest	Financial record	Register title deed	Belong to group	Total sample
High intention to invest	100%	0%	45%	7
Moderate intention to Invest	100%	0%	33%	3
Total	100%	0%	40%	10

Source: Survey team

The table below shows the experience in contracting farming with the marketing partners (e.g., technical assistance, obligation to sell, etc.). No respondents receive assistance in arranging agricultural inputs such as fingerings, and no respondents receive technical advice, 60% of respondents receive daily monitoring of their farming operations, 40% of respondents receive full purchase, and 10% of respondents are prohibited side sales. About half of the farmers have contract with their marketing partners to be conducted monitoring and to be purchased the entire amount. It means that they are

included in the value chain.

Table 3-44 Experience and investment intentions regarding contracts with marketing partners

(Unit: “yes” answered ratio)

Contract experience Intend to invest	Input arranged	Technical advice	Day to day monitoring	Purchase all goods	Prohibition of side sell	Total sample
High intention to invest	0%	0%	71%	43%	0%	7
Moderate intention to Invest	0%	0%	33%	33%	33%	3
Total	0%	0%	60%	40%	10%	10

Source: Survey team

On the other hand, following table shows that the higher the agricultural income, the higher the investment intention.

Table 3-45 Agricultural income and investment intentions

(Unit: Number of farmers, Percentage of respondents)

Farm income (N million)	< 1	1 ≤ <10	10 ≤ <100	100 ≤	Total
Total sample	1	6	2	1	10
High intention to invest	0	4	2	1	7
Moderate intention to Invest	1	2	0	0	3
Rate of high intend to invest	0%	67%	100%	100%	100%

Source: Survey team

(2) Financial literacy and investment intentions

The table below shows the financial products used by respondents. The savings account ownership rate is high at 100%. On the other hand, same as other commodities, mobile money and digital apps is limited. Only one respondent used loans from a financial institution (commercial bank).

Table 3-46 Financial instruments used and investment intentions

(Unit: ratio of respondents)

Intend to invest	Savin g accou nt	Remittan ce at bank account	Remittan ce by POS agent	Saving account through cooperativ e's arrangeme nt	Digital apps for saving and remittan ce	Borrowin g from financial institutio ns	Mobil e mone y	Total sampl es
High intention to invest	100%	0%	43%	0%	0%	14%	0%	7
Moderate intention to Invest	100%	0%	67%	0%	0%	0%	0%	3
Total	100%	0%	50%	0%	0%	10%	0%	10

Source: Survey team

The next table shows the percentage of respondents who are aware of single-digit interest rate loan, agricultural credit guarantees, and agricultural credit insurance. All farmers are aware of the ABP (CBN's single-digit interest rate loan program), but none are aware of the other financial products.

Table 3-47 Awareness and investment intentions for concessional financial products

(Unit: ratio of respondents)

Intend to invest	Single digit loan program by CBN	Single digit loan program by BOA BOI DBN	Single digit loan program by SG or LG	Credit guarantee by CBN or NIRSAL	Agricultural insurance supported by NAIC	Total samples
High intention to invest	100%	0%	0%	0%	0%	7
Moderate intention to Invest	100%	0%	0%	0%	0%	3
Total	100%	0%	0%	0%	0%	10

Source: Survey team

The next table shows the percentage of respondents who are aware of institutions that provide agricultural products. The commercial banks has 100% awareness, while for the others have no awareness at all.

Table 3-48 Awareness of agricultural lending institutions and investment intentions

(Unit: ratio of respondents)

Intend to invest	DFI	Commercial banks	MFB	Credit cooperative	Aggregator finance	ICT Company	Total samples
High intention to invest	0%	100%	0%	0%	0%	0%	7
Moderate intention to Invest	0%	100%	0%	0%	0%	0%	3
Total	0%	100%	0%	0%	0%	0%	10

Source: Survey team

(3) Investment plan and challenges

The table below shows the investment amounts and financing methods (multiple answer) by investment objective (Acquire farmland, Expand cultivation area within the farm, Acquire machineries, Expand purchase of seed and input, Purchase better seed and input, and Expand sales outlet).

Table 3-49 Investment amounts and financing methods by investment purpose

(Unit: Number of farmer, N)

Investment objective	Own fund	Financial institute	Relatives and friends	Total amount	Average amount
01_Acquire farmland	1	3	0	2,500,000	833,333
02_Expand cultivation area within the farm	0	0	0	NA	NA
03_Acquire machineries	3	9	0	73,850,000	8,205,556
04_Expand purchase of seed and input	0	1	0	500,000	500,000
05_Purchase better seed and input	0	3	0	5,200,000	1,733,333
06_Expand sales outlet	0	1	0	2,500,000	2,500,000
07_Social media and digital marketing	0	1	0	1,500,000	1,500,000
Total	4	18	0	86,050,000	4,780,556

Source: Survey team

Both the total investment amount and the average investment amount are large for the purchase of farm machinery. In addition to borrowing from financial institutions, a large percentage of farmers are considering own fund for the acquisition of farmland and the purchase of farm machinery. On the other hand, borrowing from relatives and friends is not considered as financing methods.

The following table shows the percentage of respondents who are aware of the reasons for difficulty in borrowing from financial institutions.

Regardless of the degree of investment intention, interest rates and collateral assets are the most common reasons for difficulty in borrowing from financial institutions.

Table 3-50 Reasons for difficulty in borrowing from financial institutions

(Unit: ratio of respondents)

Intend to invest	No hope to be approved	Collateral asset	Farm land not eligible for collateral	High interest rate	Documentation for application	Fear of not being able to repay	Non availability of non-interest finance	Total samples
High intention to invest	14%	71%	0%	86%	0%	14%	0%	7
Moderate intention to Invest	0%	67%	0%	67%	33%	0%	0%	3
Total	10%	70%	0%	80%	10%	10%	0%	10

Source: Survey team

The following table shows the number of respondents who consider it as important condition when they borrow from financial institutions by investment objective. The most important conditions for investment are repayment period and interest rate. It is thought that many farmers are paying attention to the cash flow due to the characteristics of agriculture business such as the timing of income and the risks caused weather and disease.

Table 3-51 Conditions that are important when borrowing from a financial institution

(Unit: Number of answers)

	Repayment period	Grace period	Interest rate	Terms of collateral appraisal	Credit guarantee	Financial advice	Assistance for documentation	Assistance to register farmland title
01_Acquire farmland	3	0	2	0	1	0	0	0
02_Expand cultivation area within the farm	NA	NA	NA	NA	NA	NA	NA	NA
03_Acquire machineries	7	1	6	0	1	0	0	0
04_Expand purchase of seed and input	1	0	0	0	0	0	0	0

05_Purchase better seed and input	1	1	3	0	0	0	0	0
06_Expand sales outlet	1	0	1	0	0	0	0	0
Total	13	2	12	0	2	0	0	0

Source: Survey team

(4) Stage-up hypothesis for aquaculture farmers

Based on the results of the above study, the pattern of stage-up of aquaculture farmers is examined as follows.

Compared to other commodities, aquaculture farmers require an initial investment for aquaculture ponds and farm machinery, therefore their commercial literacy is already relatively high and linkages to market have already been developed in many cases. Regarding the investment intentions of aquaculture farmers, it seems to exist certainly. The amount of investment intention tends to be higher when their income is higher, and it may indicate that increased income from investment is to generate further investment.

On the other hand, low financial literacy and limited knowledge about financial institutions and financial products hinder investment. In particular, the respondents have some challenges on repayment terms and interest rates when it comes to borrowing.

In light of the result of the survey, it can be effective to encourage aquaculture farmers to invest and further increase their income by providing long-term, low-interest concessional financial products through TSL, and providing timely support to improve financial literacy.

3.1.6 Farmers' organization

The number of farmers' organizations targeted in this survey was 17, and the number of samples by number of members and business category is shown in the table below. The largest number of farmers' organizations were classified as those with "less than 50" members.

Table 3-52 Number of farmers' organizations classified by number of members and business category
(Unit : Sample)

Number of members Business category	< 50	50 ≤ < 100	100 ≤ < 200	200 ≤	Total	Ratio
Farmers' organization (including financial service)	1	1	0	1	3	18%
Farmers' organization (not including financial service)	7	3	1	3	14	82%
Total	8	4	1	4	17	100%
Ratio	47%	24%	5%	24%	100%	

Source: Created by the Survey team

(1) Asset

Regarding the assets owned by farmers' organizations, land is the main physical asset, accounting for

59% of respondents. For other assets, 24% of respondents answered agricultural machinery, 18% of them answered office building, 12% of them answered warehouse, and 6% of them answered barn for chicken or cattle. Concerning farmers' organizations which include financial service, all surveyed farmers' organizations own land, implying that they operate the financial business based on sufficient agricultural assets.

Table 3-53 Assets and business category

(Unit: Percentage of respondents, multiple answer)

Asset	Office building	Warehouse	Barn for chicken or cattle	Land	Agricultural machinery	Total samples
Business category						
Farmers' organization (including financial service)	0%	0%	0%	100%	33%	3
Farmers' organization (not including financial service)	21%	14%	7%	50%	21%	14
Total	18%	12%	6%	59%	24%	17

Source: Created by the Survey team

(2) Investment plans and Challenges in finance

The table below shows the aggregate investment amount and financing method by investment purpose (number of respondents with multiple responses). In both the aggregate and average investment amounts, the larger amounts relate to increasing productivity and expanding production/service capacity. In terms of financing method, own fund and raising new equity are the most common methods, while borrowing from financial institutions is less common.

Table 3-54 Investment amount by investment purpose and business category

(Unit : Number of respondents, Multiple answer, N)

Financing method	Own fund	Raise* new equity	Short-term borrowing	Long-term borrowing	Total amount	Average amount
Investment purpose						
Increase productivity	12	10	8	5	628,000,080	48,307,698
Expand production/service capacity	2	2	0	2	267,000,000	89,000,000
Increase employment	1	1	1	1	4,500,000	2,250,000
New products and services	3	3	2	3	25,000,000	8,333,333
Total	18	16	11	11	924,500,080	44,023,813

* Capital contributions from members as needed or fundraising through equity

Source: Created by the Survey team

Next, improvements that farmer organizations expect about bank loans by investment purpose is summarized. For overall investment, the largest number of respondents answer Interest rates, followed by Credit rating, Repayment period, Grace period, and Evaluation of business.

Table 3-55 Expected improvements of bank loan by investment purpose

(Unit: Number of respondents, multiple answer)

Expected improvements Investment purpose	Credit rating	Repa ymen t perio d	Grace perio d	Upper limit of finance amount	Evaluatio n of business	Assets eligible for collateral	Interest rate	Credit guarante e
Increase productivity	1	1	2	1	1	1	2	0
Expand production/service capacity	0	0	0	0	0	0	1	0
Increase employment	0	0	0	0	0	0	1	1
New products and services	1	1	0	0	1	0	0	0
Total	2	2	2	1	2	1	4	1

Source: Created by the Survey team

Organizing the expected lenders by investment purpose, the overall investment is expected to borrow from Commercial banks, Microfinance banks, and State governments. This indicates that loans from financial institutions is expected.

Table 3-56 Expected lenders by investment purpose

(Unit: Number of respondents, multiple answer)

Investment purpose	Lender	Commercial bank	Microfinance bank	Credit cooperative	State government
Increase productivity		6	7	3	7
Expand production/service capacity		2	2	1	2
Increase employment		2	0	0	1
New products and services		1	2	2	2
Total		11	11	6	12

Source: Created by the Survey team

The following table summarizes the reasons by business type for farmer organizations that have never borrowed a short-term loan (repayment period of less than 12 months) from a financial institution. High interest rate is the most common reason for never having borrowed a short-term loan, both overall and by business category.

Table 3-57 Reasons that farmers' organizations have never borrowed a short-term loan and business category

(Unit: Percentage of respondents)

Reason Business category	High interest rate	Collateral/A ssets not available	Documentation for application is too difficult	Fear of not being able to repay	No hope to be approved	Total samples
Farmers' organization (including financial service)	67%	33%	0%	0%	0%	3
Farmers' organization (not including financial service)	50%	10%	20%	10%	10%	14

Total	54%	15%	15%	8%	8%	17

Source: Created by the Survey team

The following table summarizes the reasons by business type for farmer organizations that have never borrowed a long-term loan (repayment period of more than 12 months) from a financial institution. Overall, more than half of the farmer organizations cited high interest rates as the reason. By business category, farmers' organizations which include financial service mentioned High interest rate, No availability of collateral/assets, and Fear of not being able to repay as reasons. On the other hand, farmers' organizations which not include financial service mentioned High interest rate and Difficulties in preparing documentation for application as the main reasons. Thus, the high interest rate is a hindrance for farmers' organizations to access to loans from financial institutions about both short-term and long-term loans.

Table 3-58 Reasons that farmers' organizations have never borrowed a long-term loan and business category

(Unit: Percentage of respondents)

Reason Business category	High interest rate	Collateral/A ssets not available	Documentation for application is too difficult	Fear of not being able to repay	No hope to be approved	Total samples
Farmers' organization (including financial service)	33%	33%	0%	33%	0%	3
Farmers' organization (not including financial service)	58%	8%	17%	8%	8%	14
Total	53%	13%	13%	13%	7%	17

Source: Created by the Survey team

(3) Support to members

The following table summarizes support provided by farmers' organizations to their members by business category. Overall, the most common type of support is Business advisory on production projects (53%), followed by Introduction of off-taker (41%), Procurement of agricultural input (35%), Introduction of input dealer (29%), and Machinery rental (24%). As for farmers' organizations which include financial service, financing (100%) is of course provided, and Procurement of agricultural input (67%) and Medical or educational service (67%) are also provided. On the other hand, concerning farmer organizations which not include financial service, the most common support is Business advisory on production projects (57%), followed by Introduction of off-taker (43%).

Table 3-59 Supports to members and business category

(Unit: Percentage of respondents)

Support	Financing	Business advisory	Introduction of off-taker	Introduction of input dealer	Procurement of agricultural input	Jointly selling of product	Jointly processing	Machinery rental	Providing warehouse	Medical or educational service	Total
Business category											
Farmers' organization (including financial service)	100%	33%	33%	33%	67%	33%	0%	0%	0%	67%	3
Farmers' organization (not including financial service)	0%	57%	43%	29%	29%	14%	7%	29%	7%	0%	14
Total	18%	53%	41%	29%	35%	18%	6%	24%	6%	12%	17

Source: Created by the Survey team

(4) Challenges of farmers' organization

The following table shows the challenges on the agricultural issue by business category. Overall, Access to inputs is the most common issue, accounting for 29%, followed by High cost of transportation, labor, and fuel (24%). About farmers' organizations which include financial service, both Access to inputs and Conflict with pastoralist are answered by 67% of the respondents. On the other hand, regarding farmers' organizations which include not financial service, Access to inputs and High cost of transportation, labor, and fuel are both cited by 21% of the respondents. Therefore, the above results suggest that access to inputs is a significant challenge on the agricultural issue.

Table 3-60 Challenges on agricultural issue and business category

(Unit: Percentage of respondents)

Challenge	Access to inputs	Conflict with pastoralists	Renting a land	High cost (transportation, labor, fuel)	Lack of training	Insecurity	Lack of capital	Lack of cooperation of members	Lack of support from government	Total
Business category										
Farmers' organization (including financial service)	67%	67%	33%	33%	33%	0%	0%	0%	0%	3
Farmers' organization (not including financial service)	21%	7%	0%	21%	0%	14%	14%	7%	7%	14
Total	29%	18%	6%	24%	6%	12%	12%	6%	6%	17

Source: Created by the Survey team

Finally, the following table shows the challenges in the financial issue by business category. Overall, Lack of funds, including loans, accounts for 47% of respondents and High interest rates accounts for 29%. Concerning farmer's organizations which include financial service, Non-payment of contribution and Lack of funds, including loans, are both cited by 33% of the respondents. On the other hand, regarding farmers' organizations which not include financial service, Lack of funds, including loans, is the most common concern, accounting for 50% of the respondents, followed by High interest rates, accounting for 36%. Therefore, the above results suggest that Lack of funds, including loans, is an important issue on the financial sector.

Table 3-61 Challenges on financial issue and business category

(Unit: Percentage of respondents)

Challenge	Non-payment of Contribution	Lack of funds (including loans)	High interest rate	Lack of capital	Lack of collateral	Access to certified auditor	Total
Farmers' organization (including financial service)	33%	33%	0%	0%	0%	0%	3
Farmers' organization (not including financial service)	0%	50%	36%	14%	7%	7%	14
Total	6%	47%	29%	12%	6%	6%	17

Source: Created by the Survey team

(5) Hypothesis of stage-up for farmers' organization

Based on the results of the above consideration, the pattern of stage-up of farmers' organization is examined. Farmers' organizations often use their own funds or raise new capital as a method of financing, and rarely borrow money from financial institutions. One reason for this is the high interest rate of financial institutions, which poses a challenge for farmers' organizations to obtain loans from financial institutions. On the other hand, demand for funds, including loans, is high, and many farmers' organizations are expecting improvements in interest rates. Considering the pattern of stage-up of farmers' organization under the current situation above, it is necessary that low-interest loans that are in demand by farmers' organizations is provided through TSL, and the production activities of farmers' organizations is encouraged by utilizing it.

3.1.7 Analysis on investment plan and the financial access

Tomato grower

A farmer group in the FCT has 35 participating farmers and is cultivating tomatoes and maize. The aggregated size of farmland of each farmer is approximately 200ha. They aim is to improve unit yields and introduce double cropping by purchasing (jointly used) equipment such as irrigation pumps and pesticide sprays, using higher grade fertilizers, and increasing the amount of pesticides.

Investment needs: Equipment N15,350/ha (Total N3,070,000). It is assumed that equipment will be updated once every two years. Input cost N570,000/ha.

Financing: Short-term financing (WC) (input cost) N456,000/ha, medium- and long-term financing (funds for purchasing pumps, etc.) N12,280/ha

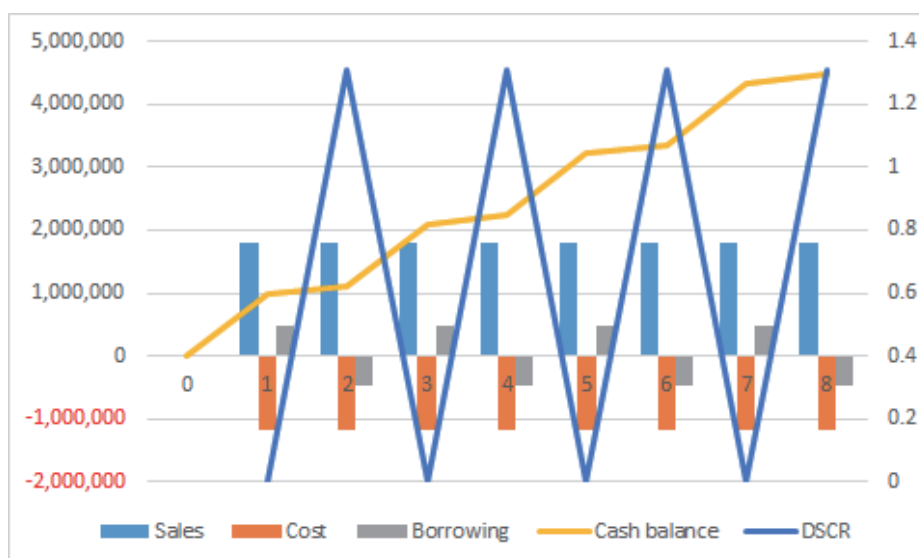
Financing conditions: 80% of the investment amount is borrowed. Agricultural insurance (NAIC subsidized insurance, farmers pay 2% of variable costs)

For the above investment plan, we created a projected cash flow and compared the case of normal loan terms and the case of concessional loan under the following conditions.

Facility	Borrowing (N/ha)	Normal terms	Concessional terms
Working capital	456,000	20% per annum, 1 year	9% per annum, 2 years
Fixed asset capital	12,280	20% per annum, 1 year	9% per annum, 2 years

Cash flow is calculated by calculating each year the purchase of fixed assets (minus), new borrowings (plus), loan repayments (minus), and interest payments (minus) in addition to "sales - expenses" (positive cash flow). The total amount of the cash flow becomes the change in the deposit account (Cash Balance). Among these, the Debt Service Coverage Ratio (DSCR) is an indicator that shows how cash flow other than borrowings and interest payments exceeds loan repayments and interest payments. A ratio of 1.4 times or more is required because a certain amount of margin is required in preparation for risks.

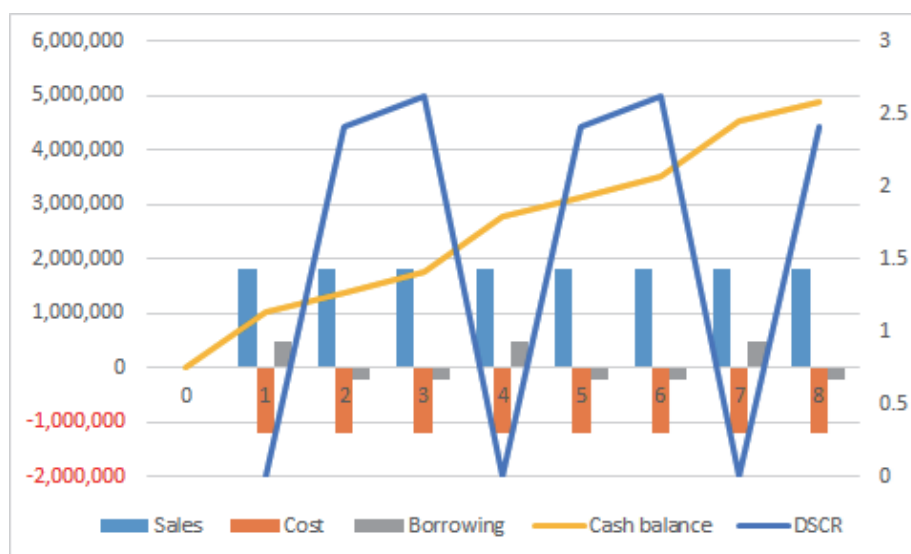
The results are shown in the graph below. In the case of normal loan conditions, the DSCR is likely to be less than 1.4, and in the case of the concessional loan conditions assumed above, the DSCR will be 2 or more.



Note: $DSCR = \text{Cash flow available for repayment of principal and interest} / \text{repayment and interest}$
Since the loan is repaid and re-borrowed every year, the DSCR becomes impossible to calculate (zero on the graph) every 2 years.

Source: Prepared by the Survey Team based on interviews with farmers and tomato transaction prices from the company survey described below.

Figure 3-1 Investment cash flow of tomato farmers



Note: Since the loan is repaid and re-borrowed every year, the DSCR becomes impossible to calculate (zero on the graph) every 3 years.

Source: Prepared by the Survey Team based on interviews with farmers and tomato transaction prices from the company survey described below.

Figure 3-2 Investment cash flow of tomato farmers (Case of concessional loans)

Poultry farmers

The poultry farmers we visited in Oyo State formed groups of 15 or more people. Each member has 3-4 ha of farmland. The leader raises 3,000 chickens, while the other members operate smaller scale poultry farming operations. After purchasing the chicks, eggs are produced and shipped, and after two

years they are shipped as chicken. Currently, the group is small and has no choice but to sell at the price set by its larger competitors when middlemen arrive by truck. They would like to expand the scale and improve efficiency.

Investment needs: Building, cage, facility cost N3,500,000/per 1,000 birds. The building and cage can be used for more than eight years, but the facility is expected to be updated every two years. The price of chicks is N450/chick.

Financing: Medium and long term loan N2,800,000/1,000 birds

Financing conditions: 80% of the investment amount is borrowed. Agricultural insurance (NAIC subsidized insurance, farmers pay 2% of variable costs)

For the above investment plan, simulation of the expected cash flow resulted in the DSCR using normal loan conditions (21% annual interest, 3-year repayment) and concessional loan (9% annual interest, 5-year repayment), improves from 0.83 to 1.45.

Aquaculture farmers

The Oyo State Aquaculture Farm Group has 20 participating farmers, each of whom produces mainly catfish, but also grains and vegetables (cassava, maize, pepper, etc.) on 2 to 50 hectares of farmland. Although it is registered as a cooperative with the state government and has a by-law, its activities as a cooperative are limited to introducing customers, providing business advisory, sharing agricultural machinery (pumps), and responding to insecurity (negotiations in case of kidnapping, etc.) There is no joint procurement, sales, or borrowing from financial institutions as a cooperative. They aim to increase yields and unit yields by increasing processing equipment (smoking) and aquaculture ponds, and purchasing high-quality agricultural materials (feed, etc.).

Investment needs:

Fixed assets: A total of N11,800,000 (per 1 aquaculture pond; the same applies below) for land preparation, buildings, equipment, smoking kiln, etc. in order to add one new aquaculture pond and start primary processing of smoked products. The equipment is expected to be updated once every two years.

Additional working capital: N1,625,000

Financing: Medium and long term loan N9,440,000.

Financing conditions: 80% of the investment amount is borrowed. Agricultural insurance (NAIC subsidized insurance, farmers pay 2.5% of variable costs)

For the above investment plan, simulation of the expected cash flow resulted in the DSCR using normal loan conditions (20% annual interest, 2-year repayment) and concessional loan (9% annual interest, 4-year repayment), showing improvement from 1.03 to 1.95.

3.2 Current status of agricultural SMEs and challenges for financial access

3.2.1 Overview of the surveyed SMEs

A total of 100 companies, 10 companies each of the same 10 location of the survey of farmers, were surveyed. Target companies are micro, small and medium-sized enterprises engaged in suppliers, agricultural production, post-harvest processing and storage, processing, distribution, retail, export, service providers, etc.

By size, the target companies are 87 micro companies and 13 small companies. There were no medium-sized companies observed. We have set Crop, Poultry/Livestock raising, Fisheries, and Others as the product categories that are mainly involved, but this is only a reference as there are in many cases involved in multiple products/categories.

Table 3-62 Number of SMEs by size and product categories

Sector Size by employee	Crop	Fishing	Poultry and livestock	Others	Total
Micro	30	8	25	24	87
Small	5	1	4	3	13
Total	35	9	29	27	100

Note: Micro refers to companies with 10 or fewer employees, small companies have 11 to 50 employees, and medium companies have 51 to 200 employees.

Source: Survey team

The average number of employees per company is 3.6 for micro enterprises and 21 for small enterprises.

Table 3-63 Average number of employees by size and product categories

Sector size by employee	Crop	Fishing	Poultry and livestock	Others	Total
Micro	4.8	2.9	3.5	2.6	3.6
Small	17.6	35.0	18.0	26.0	21.0

Source: Survey team

The average annual sales (2022) of all target companies is approximately N20 million.

Table 3-64 Average annual sales by size and product categories (2022)

(Unit: N)

Sector size by employee	Crop production	Fishing	Poultry and livestock	Others	Total
Micro	24,476,500	5,812,500	16,479,740	28,887,143	21,679,080
Small	6,506,000	2,000,000	27,800,000	13,000,000	14,210,000
Total	21,909,286	5,388,889	18,041,155	27,121,905	20,708,099

Source: Survey team

The table below shows indicators by business category (business line). Businesses include suppliers, agricultural machinery (agricultural machinery services and sales), agricultural production, service providers (including IT-related), post-harvest processing and storage, transportation, distribution, processing, retail and export, and others (including poultry and fisheries). The indicators are total assets, short-term loans and long-term loans (amount vs. total assets), annual sales, and number of companies.

Because each company was surveyed with multiple answers, the total number of companies was 121, which exceeds the 100 companies surveyed.

The highest average sales are suppliers and agricultural production. Higher ratio of debt to total assets include service providers, distribution, retail/export, post-harvest processing/storage, and processing.

Table 3-65 Financial indicators by business categories (average of companies)

(Unit: N million)

Business line	Supplier	Mechanization	Crop production	Service provider	Post-harvest & storage	Transportation	Wholesale	Processing	Retail & export	Other including Poultry & Fishery
Financial items										
Total assets	18	11	1	18	20	10	29	34	21	87
Short-term borrowing	0.3	1.3	0	0.8	0.9	0	0.7	1.1	0.7	1.1
Long-term borrowing	0.7	0	0	5.3	2.1	0	5.2	3.8	3.0	0.9
Short-term borrowing/total assets	2%	11%	0%	4%	4%	0%	2%	3%	3%	1%
Long-term borrowing/total assets	4%	0%	0%	29%	11%	0%	17%	11%	14%	1%
Annual sales	22	8	55	5	6	8	4	9	8	6
Count	57	2	6	5	14	1	5	8	19	4

Source: Survey team

3.2.2 Financial literacy

36% of companies have their financial statements audited by an accountant. For respondents who have not been audited, the survey asked them why they haven't, and the majority of the reasons are that it is unnecessary because it is not required by regulation, or that it is expensive. Looking at the relationship between the presence or absence of an audit and the presence or absence of an investment plan, the ratio of companies that have been audited to have an investment plan is lower.

26% of companies have borrowed money. There is no difference in the presence or absence of borrowing experience depending on the presence or absence of an audit. Additionally, companies with investment plans are slightly more likely to have borrowing experience.

Table 3-66 Audit and investment plan (number of respondents)

	Audited	Not audited	Audited	Total	Audited (ratio)
Investment plan					
Not have investment plan		6	14	20	70%
Have investment plan		58	22	80	28%
Total		64	36	100	36%
Have investment plan (ratio)		91%	61%	80%	

Source: Survey team

Table 3-67 Audit and experience of borrowing (number of respondents)

Experience of borrowing	Audited	Not audited	Audited	Total	Audit (ratio)
Not Have experience of borrowing		48	26	74	35%
Have experience of borrowing		16	10	26	38%
Total		64	36	100	36%
Borrowing experience (ratio)		25%	28%	26%	

Source: Survey team

Table 3-68 Investment plan and experience of borrowing (Number of respondents)

Borrowing experience	Investment plan	Not have investment plan	Have investment plan	Total	Have Investment plan (ratio)
Not Have experience of borrowing		17	57	74	77%
Have experience of borrowing		3	23	26	88%
Total		20	80	100	80%
Borrowing experience (ratio)		15%	29%	26%	

Source: Survey team

The table below summarizes the relationship between the presence or absence of borrowing experience, sales, number of employees, gross profit margin, and the ratio of current assets to monthly sales (a measurement for required working capital). There is no difference except that companies with borrowing experience have higher sales.

Table 3-69 Experience of borrowing and financial indicators

Average of financial figure	Annual sales (N)	Number of employees	Operating profit ratio	Current asset (times of monthly sales)
Have borrowing experience	28,495,200	6.2	55%	15.4
Not have experience of borrowing	18,806,245	6.1	60%	15.8

Source: Survey team

Of the borrowing experiences, 20 companies had experience with short-term loans, and the number of cases was 22. 8 cases are from commercial banks such as FCMB, Access Bank, GT Bank, and First Bank, 4 cases are from cooperatives, 3 cases are from MFBs, and 7 cases are from others (Olam, dealers, associations, etc.).

Table 3-70 Lenders of short-term loans

Lender	Count
FCMB	3
Access bank	3
GT Bank	1
First Bank	1
Cooperative	4
MFB	3
Aggregator, other	7
Total	22

Source: Survey team

Interest rates on short-term loans average 21% per annum, excluding government-backed 9% program loans, and the average loan term is 9.6 months.

On the other hand, there are 5 long-term loans from 5 companies, and the lenders are 3 MFBs and 2 associations. The interest rate is 10%, including the use of the agricultural loan credit guarantee system. The average loan term is 33.6 months.

3.2.3 Challenges on business

The table below shows the responses to issues related to a company's business, broken down by business category and expressed as a percentage of respondents. The top three items in each business category are shaded in yellow color. Looking at the top items for each business category, the most common are stable procurement, sales/marketing, and natural disaster risk.

Table 3-71 Table Challenges on business by business line

(Unit: ratio of respondents)

Business line (multiple answer) Challenges for your business	Supplier	Mechanization	Crop production	Service provider	Post harvest & storage	Transportation	Wholesale	Processing	Retail & export	Other incl Poultry & Fishery
Lack in new investment	11%	0%	33%	40%	21%	0%	0%	13%	11%	25%
Low utilization of production capacity	5%	0%	0%	20%	21%	0%	40%	38%	21%	0%
Available resource&input	25%	0%	17%	40%	21%	0%	0%	13%	5%	25%
Stable procurement of crops&commodities	7%	100%	0%	0%	36%	0%	60%	50%	37%	0%
Sales&marketing	32%	100%	0%	40%	29%	0%	60%	50%	53%	50%
Management capacity	2%	50%	0%	0%	21%	0%	40%	38%	16%	25%
Available finance	47%	0%	17%	40%	14%	0%	20%	0%	32%	50%
Cash flow volatility	7%	0%	0%	0%	0%	0%	0%	0%	0%	50%
Risk of natural disaster	7%	100%	17%	0%	50%	0%	80%	75%	37%	50%
Regulatory compliance	2%	0%	0%	20%	0%	0%	0%	0%	0%	0%
Marketing	16%	50%	0%	20%	21%	0%	20%	38%	21%	25%
Others	14%	0%	0%	20%	0%	0%	0%	0%	0%	0%
No difficulties	4%	0%	33%	0%	14%	100%	0%	0%	11%	0%
Record_Count	57	2	6	5	14	1	5	8	19	4

Next, we organized the financial (fund-raising) issues faced by companies by business category (see the table below), and looking at the top items for each business category, the most common responses were interest rates and loan repayment periods.

Table 3-72 Challenges on finance by business line

(Unit: ratio of respondents)

Business line (multiple answer) Challenges for finance	Supplier	Mechanization	Crop production	Service provider	Post harvest & storage	Transportation	Whole sale	Processing	Retail & export	Other incl Poultry & Fishery
Lack of collateral assets_Mean	30%	0%	0%	20%	7%	0%	20%	0%	16%	75%
Lack of repayment ability in cash flow_Mean	14%	50%	0%	60%	14%	0%	20%	25%	32%	25%
Need lower interest rate_Mean	68%	100%	67%	80%	64%	100%	60%	75%	58%	75%
Need longer tenure loan_Mean	40%	100%	17%	40%	50%	100%	40%	63%	32%	75%
Difficult to prepare application documents_Mean	30%	50%	0%	20%	21%	0%	20%	63%	26%	25%
Difficult to register assets for collateral_Mean	5%	0%	0%	60%	0%	0%	0%	13%	21%	25%
Program loan such as ABP is not appropriate (in detail)	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%
No need external finance_Mean	9%	0%	50%	0%	7%	0%	0%	0%	5%	25%
Other_Mean	12%	0%	0%	0%	7%	0%	20%	0%	11%	0%
Record_Count	57	2	6	5	14	1	5	8	19	4

3.2.4 Investment plans and funding requirements

Of the 100 surveyed companies, 80 responded regarding their investment intentions and plans. The breakdown is 71 micro enterprises (82% of the total number) and 9 small enterprises (69% of the total number). Looking at the average size of investment plans among 80 companies, the investment amount is N71 million (N45 million excluding land), with N21 million for buildings, N11 million for machinery and equipment, and N14 million for working capital (WC). On the other hand, the expected means of financing are N30 million from own funds, N6 million from capital increase, N17 million from borrowing from financial institutions, and N42 million from others. The assets that can be used as collateral for the loan are N22 million, which is 128% of the expected loan amount from financial institutions. Although it differs depending on the financial institution, many financial institutions require around 150% of the loan amount, taking into account discounts in the case of forced liquidation, so there may be a slight shortfall.

Table 3-73 Investment plan and source of funds (average of each responses)

(Unit: N)

Items	Amount
Investment amount	71,233,796
Land	25,692,038
Building	20,784,000
Machinery & equipment	10,900,000
WC	13,857,759
Finance resource	94,086,357
Own fund	29,627,533
Equity	5,500,000
Loan	17,258,824
Short-term loan	7,333,333
Long-term loan	9,925,490
Other	41,700,000
Available collateral asset	22,091,439
Collateral/loan	128%

Source: Survey team

We calculated the possibility of borrowing based on the investment plan figures for some business categories. Specifically, we calculated the debt service coverage ratio (DSCR) without intervention and with concessional financing, and verified whether it was possible to secure a debt service coverage ratio (DSCR) of around 1.4 (see the table below). For suppliers and processing, the DSCR without intervention is below 1.4 but above 1.4 assuming concessional financing. The collateral assets exceed the loan amount for suppliers and processing. DSCR of distribution and crop production exceed 1.4, including the case without intervention.

Table 3-74 Feasibility of borrowing by business category

(Unit: N million)

Items	Supplier	Processing	Distribution	Crop Production
Investment amount (excluding land)	53	35	20	2
Short-term borrowing	11	5	0	0
Long-term borrowing	11	18	10	5

Collateral asset	25	41	41	2
DSCR (no intervention)	1.08	0.92	2.14	1.87
DSCR (concessional loan)	1.98	1.57	5.27	3.08

Note: DSCR= Cash flow available for repayment of principal and interest / repayment and interest
The terms of the loan are that without intervention, the loan interest rate is 21%, short-term loans are repaid in one year, and long-term loans are repaid in 2.8 years (the average response from those with long-term loan experience is 33.6 months). For concessional loans, the interest rate was set at 9%, short-term loans were repaid in one year, and long-term loans were repaid in 5 years.
Source: Survey team

3.3 Trends of FinTech companies related to agricultural finance

3.3.1 Positioning of FinTech in the agricultural sector

FinTech in Nigeria is a fast-growing sector that has produced a large number of startups, and according to the Finnovating for Africa: Reimagining the African financial services landscape published by Disrupt Africa in 2023, of the 678 startups in Africa, 217, or 32%, are in Nigeria.

And while FinTech offers a wide range of services, in its Nigeria FinTech Census 2020, Ernst & Young (EY) organizes FinTech into six sectors, each with 38% payments, 23% lending, 15% savings and investment, 13% enterprise services and infrastructure, 8% crypto, and 3% for insurance technology.

Organizing the existing initiatives in the agricultural sector, many of them are related to payments and loans, but there are also initiatives related to investment and insurance, as well as initiatives that function as infrastructure for the entire VC, such as the e-warehouse receipt by AFEX. In addition, not only so-called FinTech companies such as RIBBY, Tingo Mobile, System Spec, and Pula Advisors are expanding into the agricultural sector, but also AgroMall, Zowasel, and other agriculture-related SUs are acting as coordinators to involve financial institutions and FinTechs.

Table 3-75 Classification of FinTech and examples of initiatives in the agricultural sector

Segment	Sub category	Examples
Payment	1. Digital payments 2. Mobile money & wallets 3. Payments processing & switching 4. Digital banks & accounts 5. Global transfers & remittances 6. 6. Terminal & infrastructure provider	• Riby: Riby CoBanking • Tingo Mobile: Tingo Pay • System Spec: REMITA • AFEX: Work Bench, ComX • Agro Mall: ADAP + Banking Support etc.
Lending	1. Retail lending 2. SME lending 3. Credit data analytics & loan assessments	• AFEX: Work Bench • Agro Mall: Transform Score • ZOWASE+Vbank + SimpliFi: ACES etc.
Saving, Investment	1. Digital wealth & asset management 2. Automatic savings platforms 3. Alternative investments 4. International investment platforms 5. Crowdfunding	• AFEX: Asset-Backed Commercial Paper (ABCP) • Farmcrowdy, Thrive Agric, and others had been crowdfunding, but withdrew due to deteriorating earnings from the covid-19 disaster and tightening regulations
Infrastructure	1. Financial services 2. solutions 3. Credit Infrastructure 4. APIs and Connectors	• AFEX: e-warehouse receipt
Cryptocurrency	1. Cryptocurrency exchanges & wallets	• AFEX + Sterling Bank + Binkabi: applying blockchain
Insur Tech	1. Digital insurers 2. Insurance comparison 3. services 4. Digital agents and 5. distribution platforms 6. Insurance system 7. providers	• Pula Advisors: Weather index, Yield index • ZOWASEL+P2VEST: ACES etc.

Source: Survey team

In addition, looking at the initiatives of each company, there are many initiatives where the scope of the solution spans multiple sectors. In the table below, we have organized the main FinTech initiatives related to agricultural VC by company.

Table 3-76 Examples of FinTech initiatives related to agricultural VC

Company	Outline of initiatives	Payment	Lending	Saving, Investment	Infrastructure, Cryptocurrency	InsurTech	Remarks
Riby	- The company develops management tools for union financial operations, agent-based support for union operations, and participates in financial inclusion programs. - Solutions include Riby CoBanking, Riby Agent Network, Riby CoAgent, and Riby Go.	○	○ partner	○ Agent bank		○ partner	- Promoting application-based business improvement using agents - Results of financial inclusion efforts: more than 1 million registered members and 3,000 registered associations, etc. Expansion to 25 states in Nigeria
Agro Mall	It operates ADAP as a basic system, and based on the data, provides financial services such as payment and credit guarantee, in addition to producer and farmland identification, input management, farm management reform, and harvest verification. It provides Agency Banking services using agents.	○	○ Transform Score	○ Agent bank		○ partner	- Agent is promoting the BoAT (Bank of Agricultural Transformation) concept, which provides not only finance but also comprehensive agricultural support. - Developing Transform Score as a credit guarantee index
AFEX	Developed e-warehouse	○	○	○	○	○	e-warehouse receipt serves

Company	Outline of initiatives	Payment	Lending	Saving, Investment	Infrastructure, Cryptocurrency	Insur Tech	Remarks
	- receipt system and then developed product transaction function - Developed a new system using e-warehouse receipt as a token in collaboration with Sterling Bank and Binkabi. - Provided Workbench for farm production management, including warehouse registration, and ComX, a transaction application	ComX	partner	ABCP	e-WRS Block chain	partner	- as the transaction platform for agricultural VC - Asset-Backed Commercial Paper (ABCP) securitizes the asset value of the produce
Thrive Agric	Initially working on crowdfunding, the company is now a platformer, collaborating with various partners to provide services for the advancement of agricultural VC.	○	○ partner	○ partner	○	○ partner	Recently, efforts as AgriTech using agents have become stronger.
TradeBuza	- Agri-tech based on data management and AI technology - Solutions include Trade Buza Capture, Trade Buza Agro, Trade Buza IE, and Crop Gate	○ Crop Gate	○ Crop Gate		○ Crop Gate	○	- Promoting Value Chain Financing with Crop Gate - Mainly provides systems to ABP anchor companies
ZOWASE L + Vbank+ SimpliFi	Vbank and SimpliFi collaborate to develop and	○ ACES	○ ACES			○ ACES	Recently, the company has expanded its coverage to

Company	Outline of initiatives	Payment	Lending	Saving, Investment	Infrastructure, Cryptocurrency	Insur Tech	Remarks
	service a solution for scoring farmers' creditworthiness using farmer data.						include insurance services in conjunction with P2VEST.
TINGO mobile	- As a TINGO Group company, it offers the payment solution TingoPay along with the marketplace Nwassa. - It also offers financing and insurance functions.	○	○			○	The company is working with VISA to enable card payments in 2022. AFAN has adopted the marketplace Nwassa, which is offered in conjunction with TingoPay and is expected to be used nationwide (60M detergent members)
System Specs (REMITA)	E-wallet mechanism using REMITA in NAVSA, a platform provided by NITDA, a government agency. REMITA is used as the Nigerian government's decision-making system.	○		○ e-wallet		○	Provides entrepreneurs with a closed wallet for limited use as seed money, and an open wallet for free use.
Pula Advisors	The company designs and provides innovative agricultural insurance and digital products, as well as helps smallholder farmers withstand yield risk, improve their farming practices, and					○	Provides area yield index insurance, hybrid index insurance, etc. in cooperation with agricultural SUs.

Company	Outline of initiatives	Payment	Lending	Saving, Investment	Infrastructure, Cryptocurrency	Insur Tech	Remarks
	increase their income over the long term through farm management guidance.						

Source: Compiled from interviews and site information.

3.3.2 Initiatives by Major Companies

(1) Riby

Riby is a FinTech invested by Growth Capital, founded in 2014, and is unique in that it develops management tools and agents to support union operations for union financial operations. It also participates in financial inclusion programs.

The company is promoting the organization and financial inclusion of cooperatives using POS agents, which is highly compatible with the support scheme by TSL.

Table 3-77 Initiatives by Riby

Feature		Financial Support for Associations Using Agents
Key Player		Riby
Foundation		2015
Business Model		- The company offers financial inclusion services targeting 38 million people belonging to associations and trade groups (Trade Groups), credit unions, and informal savings and loan associations. In addition to payment support through apps, the company generates revenue by using agents to provide union support services. Cooperative setup and registration with the regulatory body ➤ Cooperative branding and website development ➤ Administrative management of cooperative activities ➤ Provision of financial literacy and engagement for Informal Groups and Cooperatives ➤ Linking cooperatives and groups to Riby partnered financial service providers e.g., credit and loans institution, insurance organization, investments firms, HMOs etc.
Engaged Farmers & other Impacts		- Number of associations supported: 3,000; number of agents: 2,500 1 million participating members in financial inclusion programs
Commodities		Not specified
Organizing		Agents aid in establishing and registering associations, etc.
Production Support	Extension service	The company plans to offer the service starting in 2024.
	Procurement, Production	Unknown
	Logistics	Unknown
	Market access	According to interviews, the company may provide referrals to large off-takers such as Olam, Nestle, etc. to the cooperative.
Financial	Payment	Provides payment application and POS agent to provide business services

Support	Loan, Credit	• Provides services through collaboration with partners
	Insurance	• Provide services through collaboration with partners
ICT (network, application etc.)		• Riby CoBanking: A financial management tool for association settlement operations • Riby Agent Network: • Riby CoAgent • Riby Go
Prospect and Challenge		• Extension services are planned to be offered from 2024.
Potential cooperation with donors & JICA		• Riby is promoting the organization and financial inclusion of cooperatives using POS agents, which is highly compatible with the support scheme by TSL. • The company has shown strong interest in TSL financing.

Source: Prepared based on interviews and web information

(2) AgroMall

AgroMall was established in 2016 and is a company that provides farming advice and farm management solutions using digital tools to support smallholder farmers and agricultural stakeholders and works to improve the efficiency of the entire agricultural VC, including production and distribution.

AgroMall operates the AgroMall Digital Agricultural Platform (ADAP) as a platform system for farm management, providing data-based services for farmer and farmland identification, input management, farm reform, and harvest verification. In addition, the AgroMall Digital Agricultural Platform provides financial services such as payment support and Agency Banking services through Agents.

In addition, based on the current situation in Nigeria, where Agents function as financial infrastructure, and its own service delivery model, the company is promoting the BoAT (Bank of Agricultural Transformation) concept, in which Agents provide not only financial services but also comprehensive agricultural support at the national level.

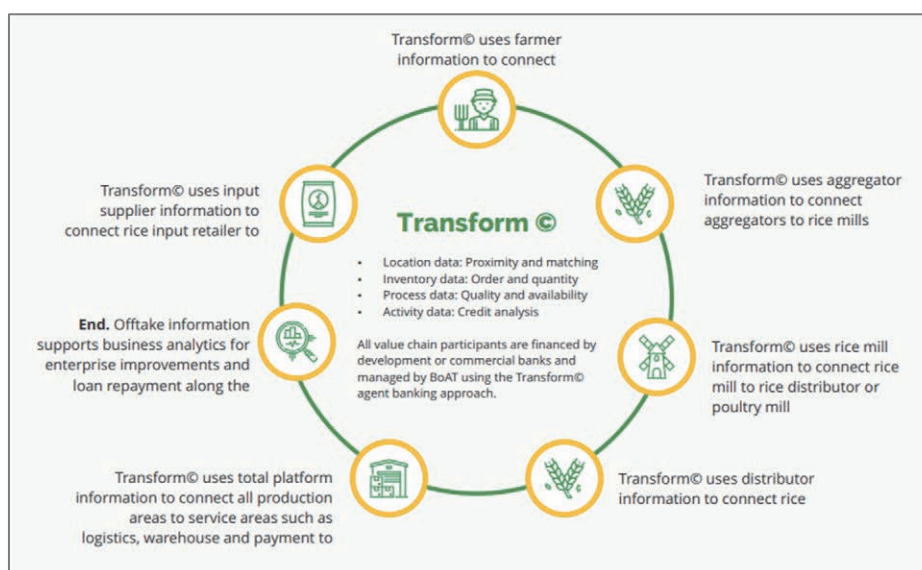
Table 3-78 Initiatives by AgroMall

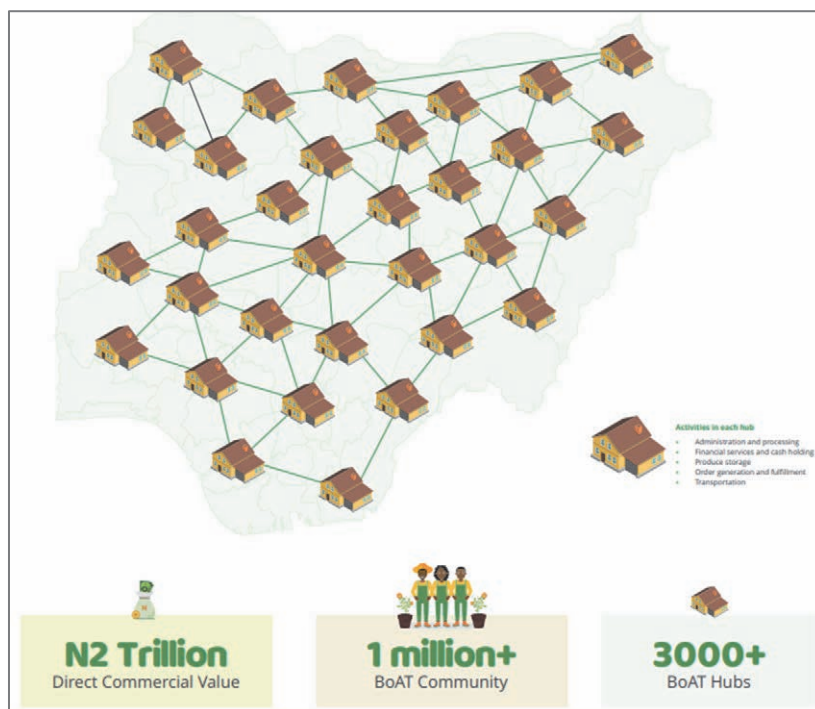
Feature		Supporting Comprehensive Farm Management Reform through Agents
Key Player		AgroMall
Foundation		2016
Business Model		• It is AgriTech, which provides farming advice and farm management solutions using digital tools to support smallholder farmers and agricultural professionals. • It operates ADAP as a platform system for farm management, providing data-based services such as identification of producers and farmland, input management, farm management reform, and harvest verification. • The company is promoting the BoAT (Bank of Agricultural Transformation) concept, in which agents provide not only financial services but also comprehensive support for farming operations.
Engaged Farmers & other Impacts		• Number of participating farmers 1.3M (2021) • BoAT community 1M , BoAT hub 3,000 (plan)
Commodities		• Rice, tomatoes, mangoes, livestock production
Organizing		• Provides farming advice and extension services using digital tools to support smallholder farmers and agricultural professionals
Production Support	Extension service	• Provides farming support through agents.
	Procurement, Production	• In addition to farmland management, irrigation, and mechanization, the company participates in processing rice, tomatoes, mangoes, etc.
	Logistics	• Provides recommendations on logistics reform

	Market access	• No information available
Financial Support	Payment	• Provide settlement support functions through ADAP
	Loan, Credit	• Develop and provide Transform Score as a data-based credit indicator
	Insurance	• Provide services through collaboration with partners
ICT (network, application etc.)		• ADAP (Digital Agricultural Platform): Provides comprehensive services based on data, including identification of producers and farmland, input management, farm management reform, harvest verification, and payment support. • Banking Support: Financial support by agents, including agricultural reforms under the BoAT concept.
Prospect and Challenge		• The BoAT initiative shows plans to deploy 1M participating communities and 3,000 BoAT hubs throughout Nigeria.
Potential cooperation with donors & JICA		• The company is promoting the organization and financial inclusion of cooperatives using POS agents, which is highly compatible with the support scheme provided by TSL; once the Extension service is implemented, financial support combined with farm management reforms is expected to function effectively. • Based on the nature of the initiatives, there is a high likelihood that the company will be interested in working with JICA.

Source: Created based on web information

As with Riby, the company is promoting the organization and financial inclusion of cooperatives using agents, which is highly compatible with the support scheme provided by TSL.





Source: AgroMall, The Agency Bank of Agricultural Transformation (BoAT), 2020

Note: Proposal to deploy about four BoAT hubs in local government areas (LGAs) to serve as bases for agricultural support.

Figure 3-3 BoAT concept of deploying agent banks throughout Nigeria

(3) AFEX

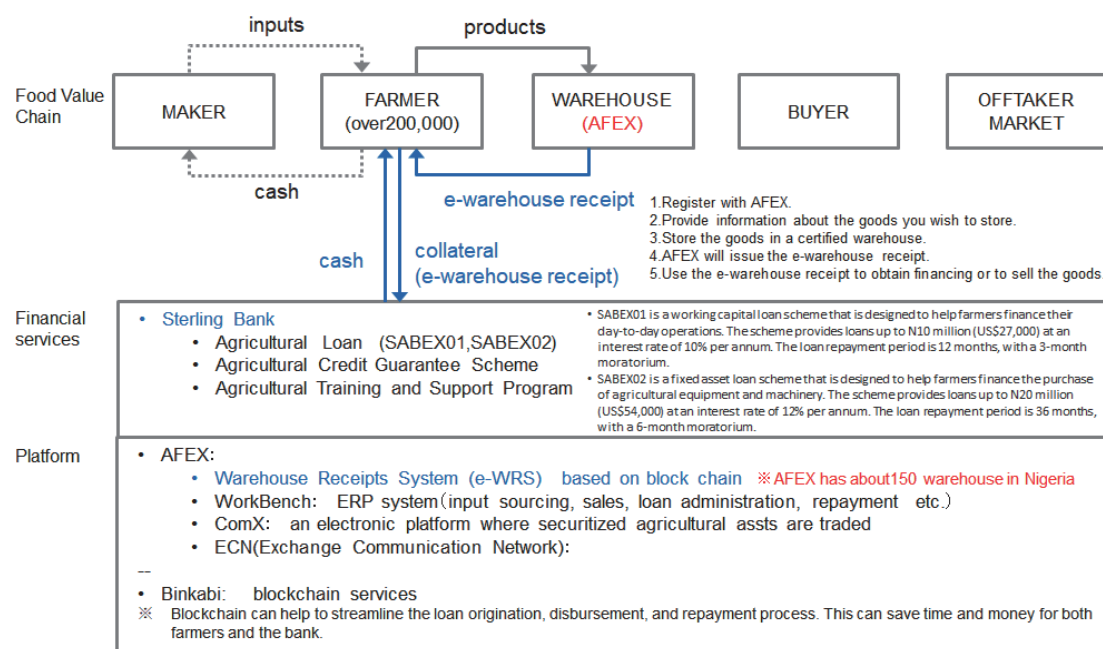
AFEX, established in 2014, is the first privately owned commodity exchange in Nigeria, and has been growing rapidly through initiatives that utilize digital technology, and was ranked No. 1 in the Financial Times (FT) Africa's Fastest Growing Companies in 2022 (in the Agriculture and Commodities category).

At its inception, AFEX focused on developing a trading platform for agricultural products, systematizing an e-warehouse receipt that farmers' cooperatives can use to store their produce in warehouses and sell it on the exchange, as well as a Work Bench that allows registered farmers to register shipments, make advances, manage loans, and more.

In 2016, the company launched a physical commodity market to trade corn, wheat, and soybeans and began offering financial products such as futures contracts and options on these commodities; in 2018, it also developed the AFEX commodity index and worked with Sterling Bank Binkabi to develop an e-warehouse receipt with blockchain technology and enhanced its function as collateral for loans by using the e-warehouse receipt as a token. In 2020, the company also launched a digital commodity market, enabling traders to trade commodities online using the ComX application.

◇ e-warehouse receipt

The e-warehouse receipt is a system that issues an e-warehouse receipt as a proof of receipt when a registered cooperative farmer delivers his/her produce to the AFEX warehouse. The e-warehouse receipt can also be used as collateral for loans.



Source: Prepared by the survey team based on various sources

Figure 3-4 Loan structure based on e-warehouse receipt ◇ Work Bench

◇ Work Bench

It is an ERP system for registration, support, and management of farmers, and farmers who use AFEX must first register. In addition to shipment registration, the system has functions for advances, loan management, etc.

◇ ComX

ComX is a platform developed with the intention of securitizing and trading agricultural assets stored in warehouses. It is connected to WorkBench to ensure that all securities are backed by physical assets.

AFEX greatly needs for funds for future business expansion, and is interest in JICA's support is high.

Table 3-79 Initiatives by AFEX

Feature	Agricultural support based on warehouses and commodity exchanges
Key Player	AFEX
Foundation	2014
Business Model	- In addition to its warehouse and e-exchange based business that collects royalties, the company also operates an investment business and logistics business through its subsidiaries. - Utilizes ICT to provide services such as credit (loans provided by partners) using e-warehouse receipt, providing ComX, an application that leverages its function as a private commodity exchange, and introducing sales channels. The system is being upgraded with blockchain.
Engaged Farmers & other Impacts	350,000 registered members (cumulative), 19,000 supporting cooperatives - Grain trading volume 200,000 MT
Commodities	11 items (maize, sorghum, soya beans, rice, sesame, cashew, coco, ginger, wheat and coffee)

Organizing		• AFEX dispatches Field Extension Officers (FEOs) to organize and support farming operations; 1,000 to 1,100 FEOs • Registration and support through WorkBench (provided through Google Play)
Production Support	Extension service	• FEOs Provide Farming Support through Cooperatives
	Procurement, Production	• While providing agricultural support through FEOs, loans are used to aid in procuring quality seeds, materials, and other resources.
	Logistics	• AFEX has 181 warehouses nationwide with 620,000 tons as collection and quality control bases • After quality inspection, AFEX provides e-warehouse receipt (credit) • Blockchain utilization
	Market access	• Provision of the trading application ComX (available on Google Play) • Introduction of trading partners based on market conditions
Financial Support	Payment	• Collaboration with NIBBS and financial institutions to encourage farmers to open accounts (having an account allows for smooth settlement at ComX)
	Loan, Credit	• Provide services in collaboration with Sterling Bank
	Insurance	• Provide services in partnership with Pula Advisors
ICT (network, application etc.)		• WorkBench: registration and management platform for farmers. Can also be used by farmers/agricultural cooperatives to store crops in warehouses and sell crops on exchanges. • ComX: Platform for commodity trading • ECN: Communication platform for stakeholders
Prospect and Challenge		• Expand the number of warehouses to 550-600 to be able to manage 10% of agricultural production. • Developing initiatives such as strengthening cleaning centers for high-quality commodity distribution. • Developing as a pan-African commodity exchange, including expansion into Kenya and Uganda.
Potential cooperation with donors & JICA		• The company provides services in cooperation with donors and financial institutions. • In addition to its own infrastructure development, the company has significant financial needs of related organizations and is interested in working with JICA, including financial and technical support aspects through TSL.

Source: Based on interviews, Impact report, and web information.

(4) ThriveAgric

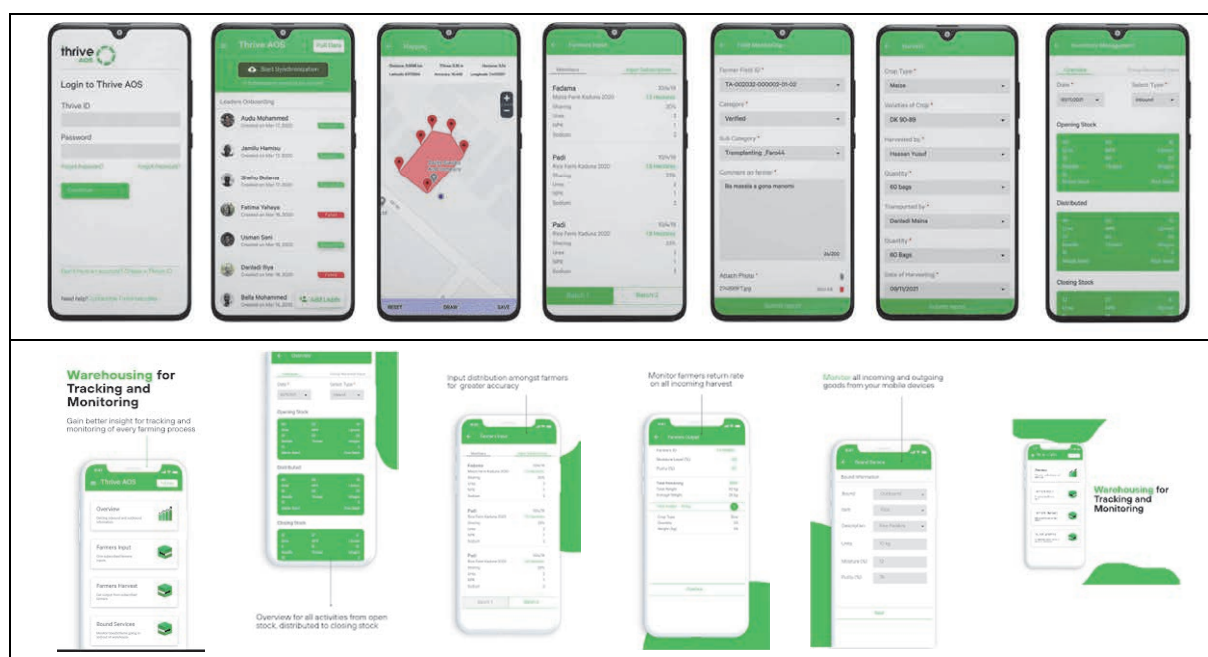
ThriveAgric is an agri-tech company established in 2017. Initially, the company actively promoted fundraising through crowdfunding, but now it is developing a business model in which it provides services in collaboration with various partners and takes commissions from service providers and others.

Thrive Agric organizes its business processes into the following six categories

- Onboarding: collect key data on farmers (name, location, gender, facial recognition, etc.), divide into clusters by community, and appoint group leaders
- Farm mapping: identifying farmland and assessing soil quality, slope, and hydraulic conditions
- Materials distribution: Based on farm mapping data and creditworthiness, loans are provided to individual farmers through group leaders. Loans are provided in the form of seeds, fertilizers, buffers, etc.

- Field monitoring: Field officers are assigned to clusters to support farmers' farming according to their situation.
- Harvesting: distributing materials needed for harvest collection, receiving farmers' commodities at warehouses, documentation, storage, and digital payment
- Inventory management: monitors deliveries to off-takers and inventory activities for all available commodities

The operations of this are conducted using apps called AOS (agent app and warehouse app). Of these, the agent app is used by agents, called field officers, to manage farmers and farms and has management functions for onboarding, farmer mapping, farm monitoring, harvesting, and logistics. The warehouse app is used for warehouse management, for loan payments and inventory management linked to deliveries.



Source: Thrive Agric website

Figure 3-5 AOS interface (upper row: agent app, lower row: warehouse app)

Table 3-80 Initiatives by Thrive Agric

Feature	Supporting Agriculture by Providing Diverse VC Services
Key Player	Thrive Agric
Foundation	2017
Business Model	• An agri-tech company that provides comprehensive agricultural support through various apps. Initially working on crowdfunding but had troubles under the COVID-19 disaster, it is now working as a platformer and collaborating with various partners to provide services for the advancement of agricultural VC. • The company is actively pursuing partnerships with government agencies, including an MoU with the Nigerian Commodity Exchange for warehousing and commodity provision.
Engaged Farmers & other Impacts	• 600,000 (2023) • Number of warehouses 515 (2023)

Commodities		• Rice, Maize, Soy beans, Wheat, Cashew, Sorghum
Organizing		• Number of agents: 2,400 • Registration and management conducted through the Agricultural Operating System (AOS)
Production Support	Extension service	• Farmer training based on GAP (Good Agricultural Practice)
	Procurement, Production	• Providing the Tradr app • Providing support through collaboration with Value Seeds, Traxi, etc.
	Logistics	• Inventory Management System (IMS) management • Support through collaboration with Kobo, Talk Logistics, etc.
	Market access	• Providing the app Tradr. • Providing support through collaboration with of-takers such as FMN, DIAGEO, etc.
Financial Support	Payment	• Promote financial inclusion by providing POS services and other services through the Tmoni application
	Loan, Credit	• Support collaboration with Sterling Bank, FCMB, TAJI Bank, Providus Bank, etc.
	Insurance	• Provide yield index insurance in collaboration with partners
ICT (network, application etc.)		• Agricultural Operating System (AOS): Agricultural management platform that serves as the foundation for the entire system • Tradr : Transaction support system • IMO: Inventory management support system
Prospect and Challenge		• It aims to increase the number of farmers it supports in Nigeria to 10 million by 2027. • The company is expanding into Kenya and Ghana, and plans to expand to Egypt, Tanzania, and Zambia in 2023, aiming to serve as Africa's commodity supply base.
Potential cooperation with donors & JICA		• He collaborates with agents in the field to support small farmers, promote union formation, and has a high affinity for agricultural development. • He has also shown interest in JICA's TSL and ToT initiatives.

Source: Based on Annual report and web information.

(5) TradeBuza

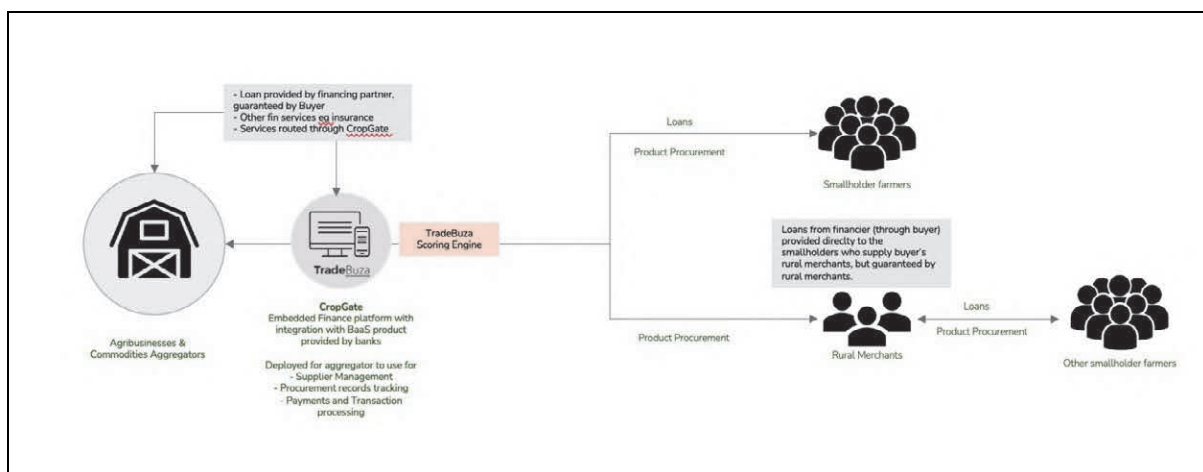
Trade Buza is an agri-tech based on data management and AI technology which provide solutions including Trade Buza Capture, Trade Buza Agro, Trade Buza IE, and Crop Gate.

- TradeBuza Capture: An end-to-end field enumeration and data management system that allows users perform KYC collection, validation, field GPS mapping, customized reporting & other data services.
- TradeBuza Agro: Web and mobile platform for efficient Outgrower Management
- TradeBuza IE: Leverages satellite, remote sensing technology and agronomic science to provide pre-loan assessment and farm monitoring services to partners (Ag-Financiers, Ag-Insurance Companies, DFIs etc.)

- TradeBuza CropGate: An embedded finance platform for agribusinesses and agro commodities traders to digitize their last mile commodities and financial operations. an embedded finance platform for agribusinesses and agro commodities traders to digitize their last mile commodities and financial operations.

TradeBuza performs their system mostly for anchor companies under ABP so far. (ABP guidelines (revised after 3 years of ABP start) require mapping of farm land and digitalized profile of farmers, etc. Their system is used to meet those CBN's requirements and for further convenience of monitoring the farming.)

TradeBuza is discussing with potential partners to expand customers including NIRSAL and interested in NAVSA. They are interested in cooperation with JICA. It might be possible to cooperate with them to improve credit guarantee system of NIRSAL or farmer monitoring system of NAVSA.



Source: TradeBuza

Figure 3-6 Value Chain finance scheme by TradeBuza CropGate

Table 3-81 Initiatives by TradeBuza

Feature	Promoting Value Chain Finance
Key Player	TradeBuza
Foundation	2017
Business Model	Agritech based on data management and AI technology. With its technological competence, TradeBuza digitizes last mile smallholder operations and finance for Agribusinesses, Farmer Organizations and different stakeholders in the Agriculture value chain.
Engaged Farmers & other Impacts	1,176,000 registered farmers (2023) - Number of registered organizations 120 (2023)
Commodities	Not specified.
Organizing	Specializes in assisting farmers and agents with applications.

Production Support	Extension service	• TradeBuza Capture Enables End-to-End Management through Visualization; TradeBuza Agro Offers Mobile Application for Producer Management.
	Procurement, Production	• Unknown
	Logistics	• Unknown
	Market access	• TradeBuza CropGate as a platform for value chain finance
Financial Support	Payment	• TradeBuza CropGate as a platform for value chain finance
	Loan, Credit	• Providing Trade Buza IE, which utilizes satellite information to provide credit, monitoring, etc.
	Insurance	• TradeBuza Capture Enables End-to-End Management through Visualization; TradeBuza Agro Offers Mobile Application for Producer Management
ICT (network, application etc.)		• TradeBuza Capture: an end-to-end field enumeration and data management system • TradeBuza Agro: Web and mobile platform for efficient Outgrower Management • TradeBuza IE: Remote Sensing & Satellite imagery API for Agriculture • TradeBuza CropGate: an embedded finance platform for agribusinesses and agro commodities traders to digitize their last mile commodities and financial operations.
Prospect and Challenge		• TradeBuza is discussing with potential partners to expand customers including NIRSAL.
Potential cooperation with donors & JICA		• He has primarily developed systems for BAP anchor companies and is considered highly capable of developing mechanisms for agricultural reform. He has been in discussions with NIRSAL and others to develop new markets and is interested in NAVSA. • They are interested in working with JICA, for example, to improve NIRSAL's credit guarantee system and NAVSA's farmer monitoring system.

Source: Prepared based on materials provided by TradeBuza and web information

(6) ZOWASEL

Zowasel is a new agri-tech established in 2019 that provides a marketplace that efficiently connects various actors in the food value chain, including farmers, cooperatives, distributors, off-takers, and financial institutions, and has developed a business model to collect fees from marketplace users.

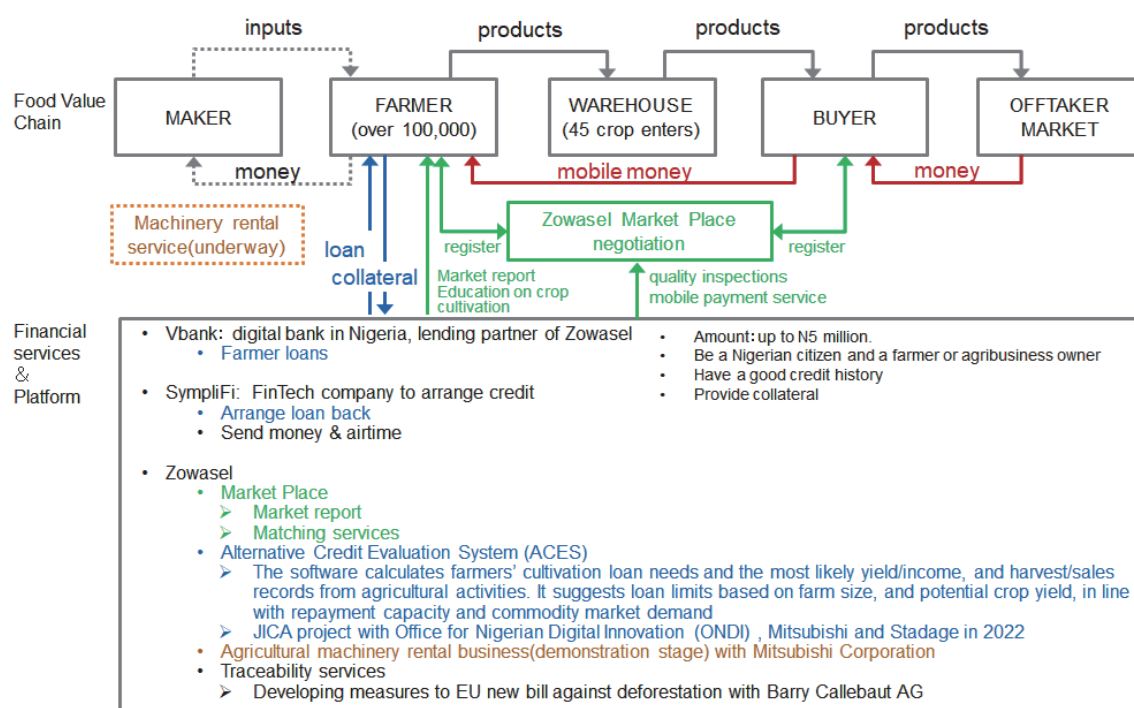
Zowasel's initiative is characterized by the fact that, with NGO investment, it has created service centers, called Crop center, in 45 regions of the country, which function not only as warehouses but also as community centers, where trusted local partners (trustees) provide human resource development, produce collection, quality assessment, and trading through an application (Zowasel Marketplace).



Source :<https://medium.com/zowasel/zowasel-opens-new-crop-centers-across-nigerias-niger-delta-region-7e5a01acc517>

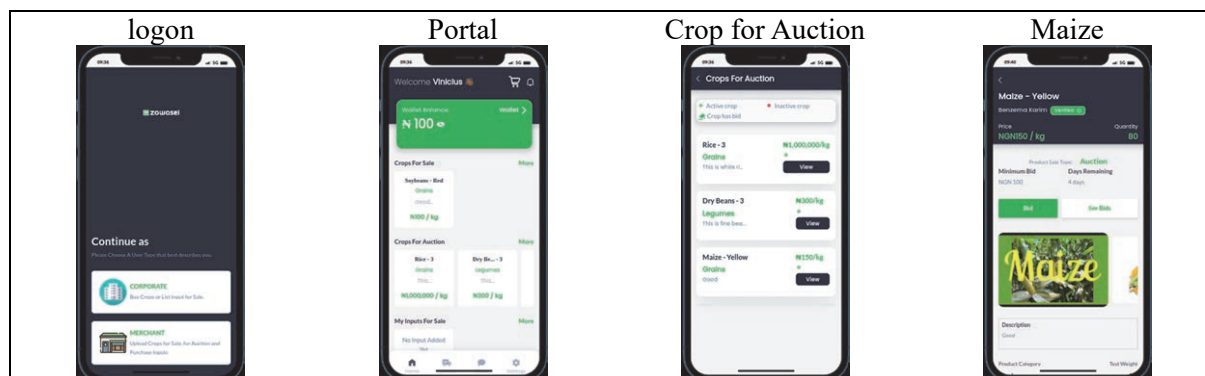
Figure 3-7 Crop Center (Ikot Esop Nsit community)

In addition, as a FinTech, the company provides a scoring service called Alternative Credit Evaluation System (ACES) in collaboration with credit institutions (SimpliFi) and financial institutions (VBank) to provide financial support to small farmers, which is used as a credit reference for farmers. In 2023, an insurance function will be added in collaboration with P2VEST.



Source: Prepared by survey team based on interviews and various documents.

Figure 3-8 Initiatives by Zowasel



Source : <https://jp.idplayer.net/apps/zowasel-mobile-on-pc.html>

Figure 3-9 Zowasel Market Place

Table 3-82 Initiatives by ZOWASEL

Feature		Marketplace-based Transaction Support and Credit Scoring Services
Key Player		ZOWASEL
Foundation		2019
Business Model		The company is developing a business model that uses digital technology to provide a marketplace that efficiently connects various actors in the food value chain, including farmers, cooperatives, distributors, off-takers, and financial institutions, and collects fees from marketplace users.
Engaged Farmers & other Impacts		The company has a network of 2 million farmers,
Commodities		- Mainly grains such as rice maize - Poultry farming is also under consideration
Organizing		- Crop centers were established as bases in 45 regions and managed by ZOWASEL through agents. - Support for farm management, farm machinery rental, etc., using digital technology.
Production Support	Extension service	Crop center provides training for farmers
	Procurement, Production	- Providing agricultural materials and renting agricultural machinery at Crop center - Mitsubishi Corporation, in cooperation with STADAGE, considering support for the supply of used Japanese agricultural machinery
	Logistics	Secured warehouses in 45 Crop Centers across the country (constructed by NGOs, etc. and managed by the union)
	Market access	- Providing market information through Market Report - Providing Zowasel Marketplace, a trading application
Financial Support	Payment	Provides mobile money payment service in cooperation with VBank
	Loan, Credit	- SimpliFi as a collateral guaranteed institution, working with digital bank VBank to provide loans. - Also offers ACES, a credit scoring service for farmers based on farmer data
	Insurance	Providing services in collaboration with P2Vest, Inc.
ICT (network, application etc.)		- Zowasel Marketplace: a trading support platform for agricultural products (one-stop shop for potential trades, negotiations, settlements, etc.) - Alternative Credit Evaluation System (ACES): a scoring system for farmers' creditworthiness

Prospect and Challenge	• Marketplace is core business, but looking to expand into farm equipment rental in collaboration with MC and STANDAGE • Projected investment of 1 million USD over 5 years. Partners also have institutions with significant funding needs
Potential cooperation with donors & JICA	• The company has been collaborating with JICA and Mitsubishi Corporation on efforts to "improve small farmers' access to finance through the establishment of a credit scoring model," and has a strong affinity for supporting farmers • The partners have a large demand for funds and are interested in TSL.

Source: Based on interviews, Impact report, and web information.

(7) Tingo Mobile

Tingo Mobile, the Nigerian subsidiary of the US-listed Tingo Group, has been offering Nwassa, a marketplace, and Tingo Pay, a payment method. payments, remittances, and card payments.

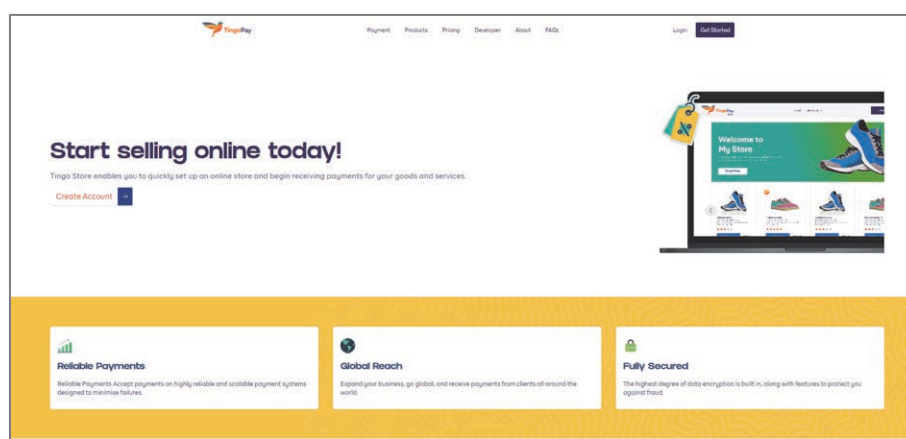
In November 2023, AFAN adopted Nwassa as its marketplace, and it is expected to expand as a transaction platform for farmers (with a potential membership of 60 million).

Table 3-83 Initiatives by Tingo Mobile

Feature		Marketplace-based Transaction Support
Key Player		Tingo Mobile
Foundation		Year 2000
Business Model		• As the Nigerian subsidiary of the U.S.-listed Tingo Group, AFAN has been offering Nwassa, a marketplace, and Tingo Pay, a payment method. • Nwassa allows farmers to register their produce for domestic and international sale, and with AFAN's adoption of Nwassa as a marketplace in 2023, it is expected to expand as a platform for farmers' transactions in the future. • Tingo Pay is a digital payment method that can be used in marketplaces, etc., and with the linkage to Visa cards in 2022, card payments are also possible.
Engaged Farmers & other Impacts		• Number of users of Tingo Mobile and Nwassa: 9.3 million (September 2022) • Potential membership of 60 million through AFAN adoption
Commodities		• Not specified.
Organizing		• Through collaboration with AFAN, may be involved in developing sales channels for farmers.
Production Support	Extension service	• Specializes in providing markets and means of payment.
	Procurement, Production	• Specializes in providing markets and means of payment.
	Logistics	• Delivery services are provided in conjunction with Nwassa.
	Market access	• Zhengqi Wang for sales channel through Nwassa
Financial Support	Payment	• Service provided through Tingo Pay
	Loan, Credit	• Service provided through Tingo Pay
	Insurance	• Service provided through Tingo Pay
ICT (network, application etc.)		• Nwassa Market : Marketplace for farmers • TingoPay : Payment method for use in Nwassa and other places. Payment, remittance, and card payment are available. • Tingo POS : Payment solution for stores

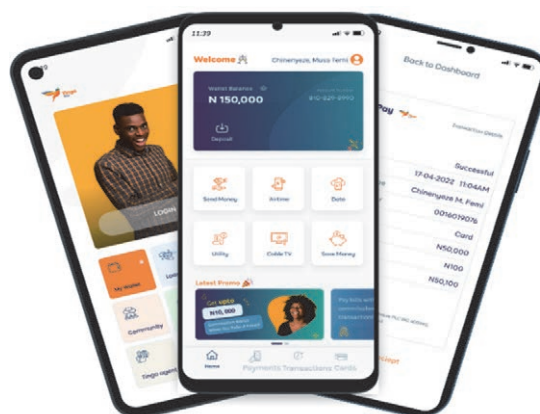
Prospect and Challenge	• As for Nwassa, AFAN's adoption of Nwassa as a marketplace is expected to lead to increased usage, with 6 million mobile phones expected to be leased starting in December 2023, and 60 million members expected in the future. • With the acquisition of Tingo by Chinese-owned MICT in 2022, the company expects to develop its business in collaboration with Tingo Foods, a food processing company.
Potential cooperation with donors & JICA	• Since it is expected to become a means of developing sales channels for farmers through cooperation with AFAN, it is considered to have a high affinity with the promotion of small-scale agriculture. • Based on the content of the initiatives, there is a high possibility that the company will be interested in working with JICA.

Source: Based on web information.



Source: <http://staging.tingomobile.com.ng/tingo-store>

Figure 3-10 Nwassa Market



Source: <https://tingomobile.com.ng/solutions>

Figure 3-11 Tingo Pay

(8) System Spec | REMITA

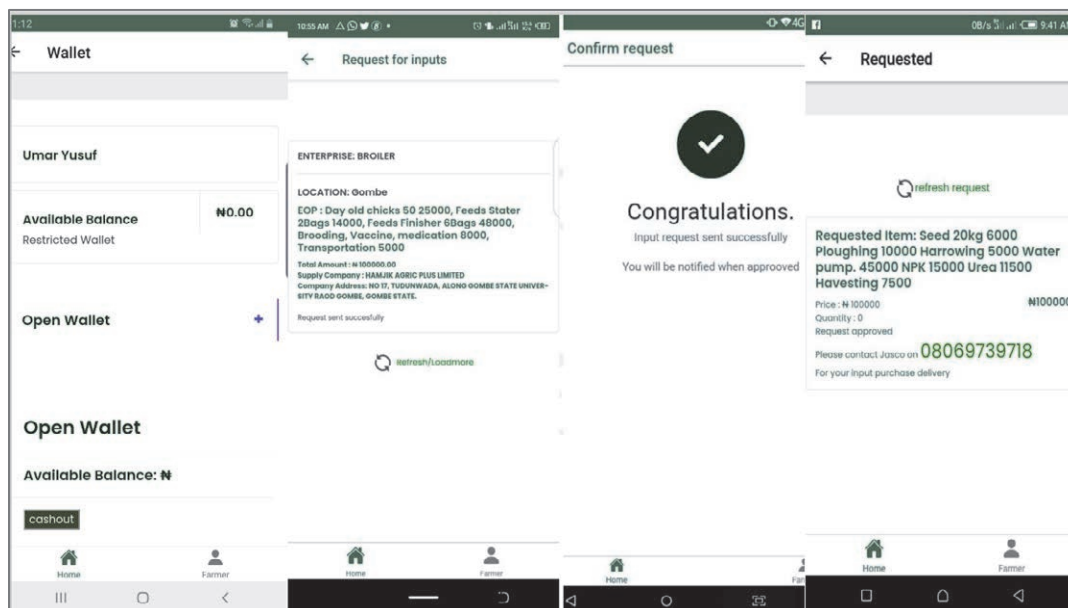
NAVSA, a digital platform in the agricultural value chain provided by the federal government, uses System Spec's REMITA for its e-wallet, which is used as a payment platform. The e-wallet works with material suppliers to provide two types of wallets: a closed wallet that can only be used to purchase

agricultural materials, and an open wallet that can be used freely, thereby effectively utilizing the seed money for farmer development. The system functions as a mechanism for fostering entrepreneurship among university students undergoing vocational training prior to graduation and may be used to provide financial assistance in collaboration with NAVSA.

Table 3-84 Initiatives by System Spec

Feature		e-wallet offerings at NAVSA
Key Player		System Spec
Foundation		1992
Business Model		- NAVSA, the federal government's digital platform in the agricultural value chain, uses REMITA, owned by System Spec, as its payment infrastructure; REMITA has also been used as the gateway for the Nigerian Ministry of Finance's Unified Account since 2012. and is also the settlement platform for NAVSA. Specifically, REMITA provides the e-wallet (closed e-wallet, open e-wallet) mechanism as a fund management mechanism for NAVSA registrants to manage and operate their seed money. - In NAVSA, System Spec is responsible for the development of the settlement part and generates revenue through the operation of REMITA.
Engaged Farmers & other Impacts		NAVSA is currently in closed use, with 965 registered users (2023), but is targeted at 10 million by 2030.
Commodities		In addition to agricultural products, NAVSA is expected to manage livestock and fisheries, but the e-wallet is a mechanism that does not dissimulate to products.
Organizing		System Spec is not responsible for coordination activities.
Production Support	Extension service	Not in charge as System Spec
	Procurement, Production	Supported by e-wallet in cooperation with material companies
	Logistics	Not supported.
	Market access	Supported by e-wallet in cooperation with Off-taker
Financial Support	Payment	A mechanism for purchasing farming materials is provided by e-wallet.
	Loan, Credit	The system is provided as an e-wallet mechanism, including the initial provision of seed money.
	Insurance	A mechanism for purchasing farming materials is provided through e-wallet. - Farmers
ICT (network, application etc.)		- Closed wallet: E-wallet whose use is specified for the purchase of farm materials - Open wallet: An electronic wallet that can be used freely.
Prospect and Challenge		At present, NAVSA is focusing on human resource development, and by targeting pre-university vocational trainees, the number of users is expected to increase in the future. In the future, NAVSA aims to become a self-sustaining management structure, including REMITA, and the challenge is to involve investors and development partners for this purpose.
Potential cooperation with donors & JICA		- NAVSA is a platform for reform of the federally operated agricultural value chain and is expected to play a significant role in agricultural promotion. - NITDA has expressed strong interest in providing TSL and technical assistance to expand NAVSA's functionality and future self-sustaining operations.

Source: Based on web information.



Source: NITDA

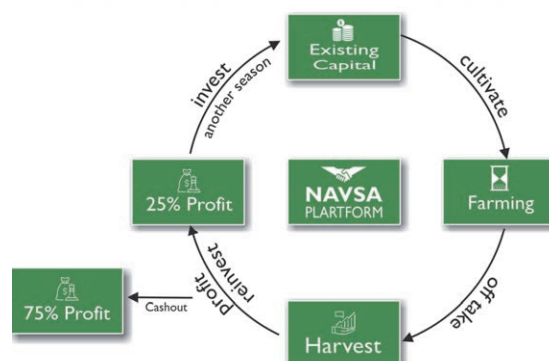
Note: Once an input plan is applied for via e-wallet and approved by the coordinator, the funds can be used.

Figure 3-12 Screen shot of e-wallet at NAVSA

e-wallet framework

- Closed wallet: Seed money can be used only for agricultural materials, so transactions can be made on the digital platform only when the use of the seed money is approved by the coordinator based on the application of the participant.
- Open wallet: An open wallet that can be used for any purpose. Registered smart farmers can cash in 75% of their net income from the farming season upon request, with 25% accumulated in the close wallet. The goal is to expand farmers' investment capital and access to loans.

Sustainability Model



Source: NITDA

Figure 3-13 Closed wallet and Open wallet

(9) Pula Advisors

Pula Advisors is an agricultural insurance and technology company that designs and provides innovative agricultural insurance products and helps smallholder farmers withstand yield risks, improve their farming methods, and increase their income over the long term through farm management guidance.

The company uses machine learning and CCE (Crop-Cut Experiments), a yield analysis method, as well as data on weather patterns and farmers' losses, to provide insurance products that address a variety of risks. While conventional insurance involves visiting farms in person to assess risks, Pula uses satellite imagery and data to predict the incidence of drought and heavy rainfall, among other things. In addition to insurance products, Pula also offers an advisory service called Field Sense that uses subscriber data and accumulated data.

In developing its business, Pula does not focus directly on farmers, but also works with SUs, financial institutions, and other organizations to develop business with manufacturers and off-takers of agricultural materials and other customers.

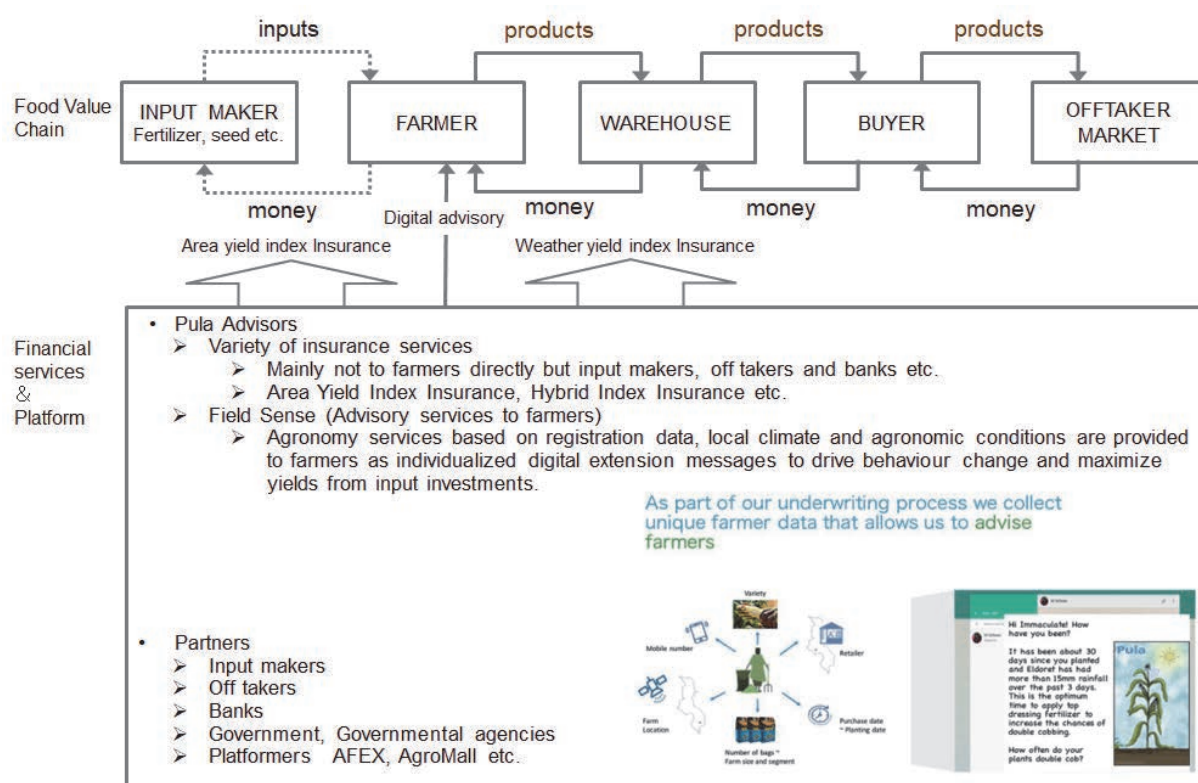


Figure 3-14 Initiative by Pula Advisors

Table 3-85 Initiatives by Pula Advisors

Feature	Providing Agricultural Insurance
Key Player	Pula Advisors
Foundation	2018
Business Model	• In collaboration with agricultural SUs, the company designs and provides innovative agricultural insurance and digital products. In addition to material

		providers and off-takers, the company wholesales its service products to insurance companies. Farmers themselves are not considered customers. • The company helps smallholder farmers withstand yield risks, improve their farming methods, and generate long-term income through farm management guidance using data from insured farmers' registers.
Engaged Farmers & other Impacts		• For insurance, 9.6 million small farmers covered so far (2023) • Number of farmers served: 7,265 (2023.6)
Commodities		• 12 products including rice, maize, wheat, cassava, soy, ginger, sugar cane, etc.
Organizing		• Support for agricultural SUs and aggregators who are organizing associations and improving farm management
Production Support	Extension service	• The company is commercializing agricultural support using its data holdings as Field Sense. • In Nigeria, information utilizing farmer registration data (7,265 farmers as of 2023.6) is provided to agricultural SUs and aggregators.
	Procurement, Production	• Not supported.
	Logistics	• Not supported.
	Market access	• Not supported.
Financial Support	Payment	• Not supported.
	Loan, Credit	• Not supported.
	Insurance	• Provide insurance services in cooperation with banks, AFEX, AgroMall, etc.
ICT (network, application etc.)		• Area Yield Index Insurance: An insurance product that uses an index to pay claims when yields in a specific region within a certain range fall below average historical yield. • Hybrid Index Insurance: A combination of Area Yield Index Insurance and Weather Index Insurance, which uses an index to pay claims on loss data that correlates well with yield data such as precipitation and temperature. Insurance products based on indexes ➤ Weather Index Insurance and Regional Yield Index Insurance provide transparency in underwriting and loss investigation because the insurance company underwrites policies with a commitment to pay claims based on a certain threshold value (above/below a threshold index), regardless of whether a loss occurs. This has the advantage of transparency in policy underwriting and loss adjustment, as well as easy and quick administrative processing. • Field Sense: Advisory services from an Agronomy perspective based on data in force
Prospect and Challenge		• We estimate the size of the Nigerian agricultural insurance market at USD 10M.
Potential cooperation with donors & JICA		• The need to insure agricultural materials and equipment purchased by cooperatives and farmers with loans and support for farming as part of their operations, has a high affinity with JICA's efforts. • They have expressed interest in working with JICA.

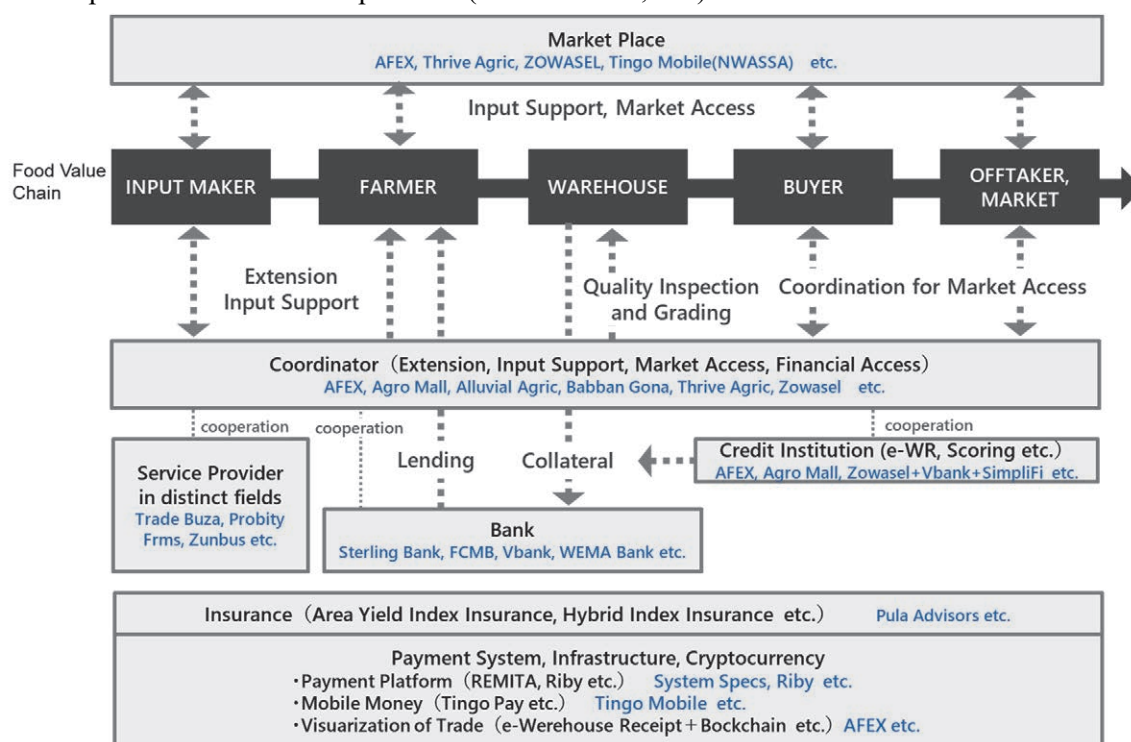
Source: Based on web information.

3.3.3 Implications for Agricultural Financial Support from the Perspective of FinTech Trends

Based on the above discussion, FinTech has had a significant impact on the financial landscape in the agricultural sector, producing companies that are engaged in payments, loans, deposits and investments, infrastructure and encryption, insurance, etc., which, as exemplified below, are contributing significantly

to promoting investment and increasing productivity in the agricultural sector.

- Improved access to finance for farmers (e.g., AFEX) through the issuance of asset-backed commercial paper (ABCP) and guarantees backed by agricultural products through e-warehouse receipts
- Improving farmers' access to finance through provision of credit information using farmland and farmer data and expansion of farmers' credit information (Agro Mall, ZOWASEL, Pula Advisors, etc.)
- Creating opportunities for farmers to procure materials and improving the efficiency of procurement operations by establishing a payment and financing system linked to farmers' procurement of materials (Agro Mall, Thrive Agric, etc.)
- Expanding sales channel development for farmers and streamlining payment operations by linking marketplaces and payment systems (Tingo Mobile, ZOWASEL, etc.)
- Facilitating farmers' access to financing for the purchase of agricultural inputs through the provision of insurance products (Pula Advisors, etc.)



Note: Includes non-FinTech SUs

Source: Prepared by the survey team

Figure 3-15 Position of FInTech and SUs in the Food Value Chain

In providing support through the TSL, it is possible to collaborate from the following perspectives

◆Cooperation for the formation of TSL recipients

FinTech companies in the agricultural sector may perform alternative functions to cooperatives, such as organizing and empowering farmers as organizers, supporting production and sales, etc., and may be the ultimate borrowers for TSL, especially for companies with large scale and growth potential.

◆Environmental improvement to increase demand for loans from cooperatives and farmers

In promoting TSL, it is important to change the mindset of cooperatives and farmers who are reluctant to take out loans, and to promote initiatives that will contribute to the expansion of farmers' demand for loans.

To improve these conditions, it is conceivable to develop an ecosystem that contributes to the expansion of farmers' demand for funds, such as making transactions in the agricultural value chain more transparent, establishing a system of collateral guarantees for produce through e-warehouse receipts, etc., improving farmers' access to finance by providing credit information to farmers, and supporting improved farm management in collaboration with agents.

In particular, it is currently difficult for farmers to directly use new technologies due to their low information literacy and delayed use of banks, etc. In light of this situation, Riby, AgroMall, and others are promoting financial inclusion by combining agents and information terminals, where financial agents who enter rural areas as payment agents also serve as advisors for improving farm management. In the case of financial support by TSL, it is possible to promote the diffusion of new technology that contributes to productivity improvement and the expansion of support for farmers by establishing a system that utilizes the network of agents owned by the organizer companies. This will promote the diffusion of new technology that contributes to higher productivity and the expansion of the number of farmers.

JICA could provide support for solution development for FinTech initiatives through Project NINJA and provide opportunities for matching with Japanese companies.

3.4 Current status of financial institutions for agriculture and the challenges

3.4.1 Challenges for agricultural finance

The current status and issues of agricultural finance are described in detail in 2.2.5. The main points are restated as follows, taking into account the results of the rural survey confirmed in 3.1.

- Banks (including MFBs) usually provide loan conditions for farmers with an annual interest rate of 24% to 60%, which many say is too high for agricultural producers. In fact, as described in 3.1 and 3.2, data from the Rural Economic and Social Survey shows that it is often difficult to realize investment plans with normal interest rates and repayment periods, which is recognized as an issue when considering investment plans.
- Farmers' financial and commercial transaction literacy is one factor that can lead to difficulties in repaying loans, including the case of ABP, especially for small-scale and subsistence farmers. On the other hand, as we saw in Section 3.1, analysis of data from the Rural Economic and Social Survey shows that there are ways to improve financial literacy through group participation and contract farming, leading to investment for business expansion.
- Regarding financial inclusion, the IMF's international comparison shows that Nigeria witnesses more bank accounts than its neighboring countries. The Rural Economic and Social Survey also showed that the ownership rate of savings accounts is high. These findings suggest that bank agents are functioning, and the use of agents in financial sector businesses can be considered to be a way to leverage Nigeria's advantages.
- Cooperatives, which are supposed generally to play a major role in farmers' access to finance, have issues in Nigeria with regard to their organizational ratio, the system of support for primary cooperatives through APEX, and the obligation for lower cooperatives to join upper organizations. On the other hand, in Nigeria, many startups that function as quasi-agricultural cooperatives operate autonomously and are achieving results. However, the cooperative system needs to be restructured to create a path for a large number of farmers to develop for further growth through participation in traditional cooperatives.
- Regarding the formation of VC and contract farming, there was an opinion that clauses prohibiting side-selling were not widespread in Nigeria. The Rural Socio-economic Survey also found that there were only a limited number of farmers who produced crops under clauses prohibiting side-selling. On the other hand, there were some farmers who had experience in contract farming where the contract buyers purchased all their crops, and those farmers tend to have higher financial literacy and a desire to invest.
- Regarding farmland collateral, there are many opinions that the farmland of small-scale farmers is often not registered and is not used as collateral much. According to the results of the Rural Socio-economic Survey, 17% of farmers registered their farm land. As for the reasons for not registering, many respondents pointed out lack of knowledge and high costs, but other reasons were concentrated that the land belonged to the family. On the other hand, in surveys and interviews with banks, there are many cases in which farmland is not considered to be an asset eligible for collateral. In addition to alleviating conflicts in rural areas, the issue of farmland

requires institutional policy intervention such as the development of a resale market for farmland.

In the following, we will summarize issues other than the current situation and issues faced by financial institutions described in 2.2.5, especially issues related to development finance.

3.4.2 Onlending program loans in which banks perform PFIs

As summarized in 2.2.5, the CBN, BOI, and DBN are implementing many on-lending loans, and the targets of support are not only agriculture sector but also corporate productivity improvement, support for micro, small and medium-sized enterprises, and agents of banks (businesses that carry out banking operations in rural areas with few bank branches), and industrial promotion in non-oil fields. The table below provides an overview of the onlending programs. Those for which CBN is performing the implementing agency accounts for most of the total, with an estimated balance of N 1,866 billion in 2021.

Table 3-86 Summary of Onlending programs of CBN and DFIs

Implementing agency	Target	Balance as of 2021 (N Billion)
CBN*	Agricultural producers (ABP) Agricultural enterprises (CACS) Support priority commodities of each States Facilitate productivity of enterprises MSMEs Support liquidity of State governments Agents of banks Non-oil sector export creative business (IT, fashion, movie, music)	1,866 (ABP: N299) (CACS: N241)
BOI	Restructuring of loans to SMEs Restructuring of loans to power and aviation	184
DBN	Concessional loans to MSMEs	193
Total		2,244

Note: Restructuring loans are to change loan terms that allow borrowers who have difficulty making repayments, by such as lowering interest rates or lengthening the term, to make repayments possible.

*Include: ABP, CACS, AADS, P-AADS, RSSF, RSSF-DCRR, HIS-DCRR, MSMEF, State Bailout Funds, SANEF, NESF, CIFI, ECA-Secured Loans Funds

Source : Annual Reports of commercial banks. Amount of ABP and CACS are partially based on interview with banks.

The following is a breakdown of commercial banks' funding amount, with deposits from customers accounting for N 40,280 billion, or 65.9% (2021). Funding from the CBN is N 1,835 billion, accounting for 3.0% of the total funding.

Table 3-87 Funding source of banks

(Unit: N billion)

Items	2018	2019	2020	2021	Share
Deposits	23,052	26,244	34,775	40,280	65.9%
Loans in national currency	2,662	3,074	3,043	3,881	6.4%
of which Other Loans from Central Bank NC	1,094	1,286	1,471	1,835	3.0%
of which Loans Other Depository Corporations NC	981	1,172	1,053	1,439	2.4%
of which Other Loans from Other Financial Corporations NC	190	258	169	192	0.3%
of which Loans Central Government NC	211	215	203	210	0.3%
Loans in foreign currency	2,074	2,576	2,488	3,621	5.9%
of which Other Loans from Nonresidents FC	1,685	1,952	1,792	2,531	4.1%
Other accounts payable	6,015	6,078	7,355	7,629	12.5%
of which Provisions for Losses	1,824	1,297	1,342	1,337	2.2%
of which Accumulated Depreciation	810	874	970	1,027	1.7%
Other liabilities	47	47	115	69	0.1%
Shares and other equities	3,856	4,504	5,189	5,602	9.2%
Total liabilities	37,706	42,524	52,966	61,083	100.0%

Source: Statistics Bulletin, CBN

The table below shows the outstanding amount of each commercial bank's on-lending facility loans implemented by the CBN and DFI (based on the outstanding amount in 2021, based on the Annual Report available online). 14 commercial banks have agriculture-related TSL balances. ABP has balances at Unity Bank, GT Bank, Sterling Bank, and Wema Bank. CACS has balances of around N billion or more at Fidelity Bank, First Bank, Sterling Bank, UBA, Unity Bank, Zenith Bank, FCMB, and Stanbic IBTC.

Commercial banks and DFIs also raise funds from overseas development finance institutions, as shown in the second table. The total amount is approximately N 1,911 billion, which is part of the amount N 2,531 of "Loans in foreign currency > of which other loans from nonresident FC" of in the table above "Funding source of banks".

Table 3-88 Table Balance of each onlending programs by banks

(Unit: N million)

	Access Bank Plc	Ecobank Nigeria Plc	Fidelity Bank Plc	FIRST BANK NIGERIA LIMITED	First City Monument Bank Plc	Guaranty Trust Bank Plc	Polaris Bank Plc	STANBIC IBTC BANK PLC	Sterling Bank Plc	Union Bank of Nigeria Plc Africa Plc	United Bank For Africa Plc	Unity Bank Plc	Wema Bank Plc	Zenith Bank Plc	BOA	BOI	Total
BOI																	0
BOI SMERRF	2,380								2,241								4,621
CBN/BOI PAIF	1,892		5,911		14,737		1,099	737						3,983			28,359
BOI Power and steel	10,374																10,374
CBN/BOI SME / Manufacturing Intervention Fund		9,996	71,920		1,692	17,002				1,294	3,524			3,626	32,266		141,320
DBN	73,892	50,458	20,099		34,392	5,003							9,419				193,263
CBN ABP						66,828			29,352			200,097	3,138				299,414
CBN AGSMEIS/RSSF																	0
CBN CACS	6,002		10,217	48,753	9,485	8,046	829	9,155	40,098	622	11,674	50,024	2,610	43,631			241,146
CBN AADS	2,085		375											8,363			10,823
CBN P-Aads Loan						1,712											1,712
CBN RSSF	13,884	23,798	15,383		9,991	18,822	2,750	10,999	4,537	15,617	11,534		12,142	40,398	90,202		179,855
CBN MSMEDF loan					229	6726							507	1,233			98,897
CBN - State Bailout Funds			89,782				52,570				35,309		8,756				186,417
CBN SANEF	2,027					981											3,008
CBN RSSF DCRR	211,804		147,227		87,374												446,405
CBN NISF	4,022		16,094			911			2,823					19,593			43,443
CBN CFI	1,625	440												229			2,294
CBN Salary Bailout facilities	61,358													136,605			197,963
CBN ECA Secured Loans Fund	110,798					13,978			13,746								138,522
CBN HSI DCRR	16,739																16,739
CBN Intervention fund																	
CBN Industrial Borrowing																185,408	185,408
Nigeria Mortgage Refinance Company	5,564							3479	1954							201,989	201,989
Total	524,446	84,692	377,008	48,753	157,901	140,008	57,248	24,370	94,751	17,533	62,041	250,122	40,198	286,301	90,202	387,398	2,642,971
% to Total assets	4.5%	3.4%	11.5%	0.5%	6.3%	2.6%	4.4%	0.9%	5.8%	0.7%	0.7%	46.4%	3.4%	3.0%	252.2%	22.6%	4.0%

Note: Programs with light orange shading is for agriculture sector. Those with light blue shading partially include loans for agricultural sector.
Source: Survey team

Table 3-89 Balance of loans from foreign development agencies by banks

(Unit: N million)

Foreign development financial institution	Access Bank Plc	Fidelity Bank Plc	FIRST BANK NIGERIA LIMITED	First City Monument Bank Plc	Guaranty Trust Bank Plc	Polaris Bank Plc	STANBIC IBTC BANK PLC	Sterling Bank Plc	Union Bank of Nigeria Plc	United Bank For Africa Plc	Unity Bank Plc	Wema Bank Plc	Zenith Bank Plc	DBP	BOI	Total
AFDB	13,437	20,294					137			32,151		3,156		61,015	15,323	145,513
Proparco			10,654		1,994					36,091						48,739
AFD	11,851									8,453				38,020		58,325
United States International Development Finance Corporation									62,168							62,168
IBRD														139,347		139,347
KfW														46,510		46,510
African Development Fund														13,242		13,242
Africa Agric and Trade Investment Fund								2,100								2,100
CDC Development Finance							31,819									31,819
European Investment Bank	32,502	1,813		2,321		2,297				17,670				49,863		56,603
IFC	58,767		53,045		18,208											179,883
Oilcredit Cooperative Society, Netherlands				4,253												4,253
African Export-Import Bank (Afrexim)	30,848	24,745		42,087					35,382	49,860	8,365		65,936		722,041	979,264
Netherlands Development Finance Company	140,460															140,460
Deutsche Investitions- und Entwicklungsgesellschaft (DEG)	3,454															3,454
Total	291,319	46,852	63,699	48,662	20,202	2,297	31,956	2,100	97,550	144,225	8,365	3,156	115,799	298,135	737,364	1,911,681
% to Total assets	2.5%	1.4%	0.7%	2.0%	0.4%	0.2%	1.2%	0.1%	3.8%	1.7%	1.6%	0.3%	1.2%	59.4%	43.1%	

Note: Amount is USD denominated

Source: Annual reports of banks

DBN and BOI receive loans from overseas development financial institutions, and a portion is re-lent to commercial banks as TSL for development purposes (forming part of the on-lending program financing mentioned above). The purpose of support is to promote finance for small and medium-sized enterprises and does not target the agricultural sector.

The funds that commercial banks receive directly include funds that have non-concessional interest rates, and are thought to include funds that are not intended for development purposes but for the purpose of recapitalizing banks.

Case examples of Proparco

Proparco, a development financial institution affiliated with the AFD (French Development Agency), uses Nigerian commercial banks¹³⁰ as PFIs to provide long-term funding to SMEs, as well as credit support (risk sharing) for social enterprises and the agricultural sector.

There are three support methods: providing credit guarantees for loans made by PFI (currency is based on Naira), on-lending to PFI (currency is USD), and direct financing.

PFIs are selected by sending questionnaires from among the top 10 commercial banks in terms of asset size. Reporting is required on a portfolio basis rather than on a transaction basis. Monitoring is also portfolio-based, so KPIs are in the form of covenant matrices. For example, changes in the composition ratio of the PFI portfolio are included.

The credit guarantee covers loans of Euro 5,000 or more, not small loans. In addition, Proparco will not exercise the right of indemnification for administrative efficiency (However, in order not to cause moral hazard, (1) the agreement should be such that the guaranteed loans are automatically determined, and (2) the obligor must not be informed of Proparco's guarantee.).

Table 3-90 Overview of credit guarantee of Proparco

Features	Outline
Portfolio guarantee	- Proparco covers a certain percentage of bad debt losses (such as 50%) for loan portfolios that meet the requirements agreed with the PFI. - Qualified loans (guaranteed loans) that are made during the contracted period are automatically included in the guaranteed portfolio.
Loans to be covered	- Amount: equivalent to euro 5,000 or more - Duration: 12 months - Interest rate: Not specified. - Impact-related requirements: For example, loans to SMEs targeting investment projects that increase the employment of women above a certain level.
Collateral	Subject to PFI's regular internal policy
Implementation of guarantee	For unpaid loans, the status of the borrower will be checked, but Proparco does not execute the right of indemnification after the guarantee has been implemented, and no collection action will be taken.

Source: Made by the Survey team based on interview with Proparco

Onlending sets a USD credit line upon submission of a sub-loan candidate in pipeline. PROPARCO does not intervene in setting interest rates for sub-loan. PFIs are expected to provide sub-loans on more favorable terms than usual by obtaining USD liquidity.

¹³⁰ As shown in the previous table, the balances for 2021 are confirmed for First Bank of Nigeria, Guaratee Trust Bank, and United Bank for Africa.

Table 3-91 Overview of onlending scheme of Proparco

Features	Outline
Loan from Proparco to PFI	• Currency: USD • Amount (credit limit): Maximum USD 85 million • Loan disbursement: PFI submits a list of sub-loans that meet the requirements agreed between Proparco and the PFI, and Proparco disburse the PFI with a US dollar-denominated loan equal to the total amount. • Interest rate: Normal US dollar-denominated interest rate with no preferential treatment (Example is below). ➢ First Bank of Nigeria: Amount USD 65 million, period 2016-2024, interest rate fixed at 5.78% ➢ United Bank for Africa: Amount USD 85 million, period 2020-2027, interest rate 6 month Libor +320bps
Sub-loan	• Loans that meet the eligibility criteria agreed upon by Proparco and the PFI (for example, loans for SMEs managed or owned by women, etc.). • PFI submits to Proparco a list of sub-loans and documentation of eligibility.

Source: Made by the Survey team based on interview with Proparco

Examples of financial assistance projects implemented by Proparco in recent years are listed in the table below.

Table 3-92 Example of recent financial assistance projects of Proparco

PFI	Date of signature	Support to PFI	Project impact
FCMB	2021/10/28	• Loan: USD 35million • Portfolio guarantee: N 5billion (cover up to 70% of target loans)	Financing approximately 1,600 SMEs. More than 300 SMEs shall be run by women. (Part of the 2X Challenge)
United Bank for Africa (UBA)	2020/12/7	• Portfolio guarantee: N 1.9billion (cover up to 50% of target loans)	At least 30% of eligible loans will be for the education sector and women-owned SMEs.
Access Bank	2020/7/23	• Loan: USD 27.5million	Indirectly support more than 7,200 jobs through financing about 200 companies. Support directly the employment of 50 people (half of whom are female management) at the bank. (Part of the 2X Challenge)

Source: Made by the Project Team based on Project Sheets of Proparco

Proparco's scheme provides direct loans and credit guarantees to the private sector and is different from JICA's TSL scheme, which is a loan to government agencies. Therefore, it cannot be directly used as a reference. However, in other TSLs, there are cases where the operation of monitoring and KPIs assessment becomes a burden on PFIs and implementing agencies, so an efficient operation scheme should be considered.

3.4.2 Development finance for agriculture

(1) Market size of loans for agricultural sector

Regarding agricultural loans, the CBN publishes figures for banks' agricultural loans. As mentioned previously, agricultural loans include loans for agricultural producers (purchase of inputs, investment in

farm maintenance, agricultural machinery, post-harvest facilities, etc.), loans for livestock/dairy products, poultry farming, fisheries, etc. As a general rule, loans to companies specializing in food processing are not included. This figure was defined as agricultural financing in a narrow sense. In addition, we added what is considered to be agricultural loans from BOI, the loan balance from BOA, and the estimated loan balance from credit unions to arrive at the agricultural loan balance in a broad sense (see the table below).

Table 3-93 Estimated market size of loans for agricultural sector (2021)

(Unit: N billion)

Agricultural loan balance (Broad definition)		1,578
	Narrow definition of agricultural loans	1,458
	Banks (private funds)	605
	Banks (CBN's onlending programs)	853
	BOI	72
	BOA	11
	Credit societies	37
Banks loans to enterprises on agricultural VC (private funds)		NA

Note: The following assumptions were made.

Narrow definition of agricultural loans: From CBN Statistics Bulletin

Banks (CBN's onlending programs): Assumed to be $ABP + CACS + (RSSF + DCRR) \div 2$.

Banks (private funds): Narrow definition of agricultural loans - Banks (CBN's onlending programs)

BOI: Based on the BOI's annual report, it is the sum of the Agricultural Development Fund (AVCF) and loans to agricultural producers.

BOA: Loans to customers in annual report of BOA

Credit union: CFAN has loaned 50 billion Naira to State APEX in the past two years (interview), so the balance is $N25\text{billion} + (N25\text{billion} \div 2) = N37\text{billion}$ (CFAN mainly provides short-term loans) (assuming that in addition to the 25 billion annual loan disbursements, about half of the previous year's disbursements remain).

On top of agricultural loans in a broad definition, there are loans made by private banks to agricultural VC companies, but there is little data to estimate this amount. However, the question was asked in the survey form for banks, and the amount of loans to enterprises on agricultural VC which are not included the agricultural loans in narrow definition was about 50% to 100% equivalent of agricultural loans in a narrow definition.

As a result of these calculations, CBN program loans account for 59% of agricultural loans in a narrow sense. Adding agricultural loans by DFI to CBN program loans amounts to N936 billion, which accounts for 60% of agricultural loans in a broad definition. In this way, government intervention funds (development finance) are thought to account for the majority of the agricultural financing sector.

(2) Review of development finance

As mentioned previously, various opinions have been reported regarding CBN's development financing in the agricultural sector after a large number of farmers were unable to repay ABP loans. Since October 2023, the CBN Governor announced a policy to suspend direct involvement in development finance, including for the agricultural sector.

- “There is need to pull the CBN back from direct development finance interventions into more limited advisory roles that support economic growth.”¹³¹
- “CBN wishes to inform you that it has stopped accepting new loans applications for processing under any of its existing intervention programmes and schemes.”¹³²
- “In line with our strategy to refocus on our core mandate, the CBN will discontinue direct quasi-fiscal interventionist activities and instead utilize orthodox monetary policy tools for implementing monetary policy,”¹³³

On the other hand, FMAFS proposes restructuring of the agricultural finance intervention scheme as follows in the "National Rice Development Strategy II" announced at the end of 2022.

Priority Five: Improve Access to Credit and Use of Financial Services

Long- term (5 years and more):

- Setting aside harmonized N3.5 trillion (USD10 billion) agribusiness portfolio in CBN and managed by relevant institutions; NIRSAL Microfinance bank and BOA, who are specifically set for agribusiness financing across all the value chain.
- Restructuring and capitalizing NIRSAL to be able to cover USD10 Billion agribusiness credit risk (maximum), restructuring and recapitalizing NAIC to act as re-insurance to all agribusiness Insurance portfolios of commercial insurance companies.
- Restructuring and recapitalizing BOA to the tune of USD10 Billion (min) to operate on a large scale.

Priority projects in the field of agricultural finance will be considered in light of this movement to review development finance in general.

3.4.3 Current Status of Environmental and Social Management Systems (ESMS)

(1) NSBP (Nigeria Sustainable Banking Principles)¹³⁴

The Nigerian Bankers Commission led by CBN enacted the NSBP in September 2012 to create a positive development impact on society while protecting the communities and environment in which financial institutions and their customers operate. It applies to all banks, discount houses¹³⁵ and development finance institutions in Nigeria.

The NSBP consists of the following documents and has been signed by the CBN, BOI, BOA, NACRD (Nigeria Agricultural Cooperative and Rural Development) and major commercial banks for compliance.

- 1) The Nigeria Sustainable Banking Principles;
- 2) The Nigeria Sustainable Banking Principles Guidance Notes;

¹³¹ <https://www.cbn.gov.ng/Out/2023/CCD/CBN%20UPDATE%20OCTOBER%20%202023%20new.pdf>

¹³² <https://www.vanguardngr.com/2023/12/breaking-cbn-says-banks-now-responsible-for-loans-recovery-suspends-further-applications/>

¹³³ <https://leadership.ng/new-policy-direction-1358-projects-threatened-as-cbn-stops-intervention-funding/>

¹³⁴ <https://www.cbn.gov.ng/out/2012/ccd/circular-nsbp.pdf> (Accessed: 13 Dec. 2023)

¹³⁵ A firm that handles government bonds and short-term financial securities in the short-term money market

- 3) Nigeria Sustainable Banking Principles Power Sector Guidelines;
- 4) Nigeria Sustainable Banking Principles Agriculture Sector Guidelines; and
- 5) Nigeria Sustainable Banking Principles Oil and Gas Sector Guidelines.

(2) BOI and BOA

BOI, which is envisioned as a PFI, has its own ESMS by applying standards and guidelines such as NSBP mentioned in (1) above and IFC's Performance Standards¹³⁶ and manages environmental risks, social risks, and governance risks. The company will respond to the situation and introduce appropriate mitigation measures if necessary.

It was not confirmed whether BOA, which is also assumed to be a PFI, has the ESMS or not. However, since BOA is a signatory to the NSBP, even though it does not have its own ESMS, it is considered to comply with the principles and guidelines of the NSBP.

(3) Commercial Bank

More than 20 commercial banks have signed the NSBP mentioned in (1) above, and it can be assumed that each bank has an ESMS in line with the NSBP guidelines. For example, according to responses to a questionnaire given to financial institutions, First Bank of Nigeria, First City Monument Bank and Union Bank of Nigeria have the following ESMS items in place as part of their risk management.

1. Environmental and social consideration policy/environmental and social management system
2. Procedures (screening, categorization, review procedures)
3. Organizational structure and personnel in terms of environmental and social considerations
4. Monitoring and reporting procedures
5. Record of environmental and social considerations
6. Capacity building measures

(4) Microfinance Bank

Of the eight Microfinance banks that responded to the financial institution questionnaire, only one bank has all of the environmental and social management system items listed in (3) above in place. Other banks have some items in place, but not most items. Microfinance banks are expected to provide small loans, and it is difficult to imagine them lending to projects that have a large impact on the environment and society. However, in order to contribute to future sustainable development, enlightenment regarding environmental and social management is necessary.

From the above survey, it appears that BOI has its own ESMS, and commercial banks also have their own systems. However, they need to be reconfirmed when they participate as TSL's PFI. Additionally,

¹³⁶ <https://www.ifc.org/en/insights-reports/2012/ifc-performance-standards> (Accessed: 13 Dec. 2023)

in the case of BOA and Microfinance banks participating as PFIs, they will need support such as training to supply ESMS deficiencies.

Furthermore, in order to ensure that TSL sub-projects comply with the JICA Environmental and Social Consideration Guidelines, it is desirable that the CBN and JICA jointly develop an ESMF (Environment and Social Management Framework) for this TSL.

3.5 Priority projects for agricultural finance

3.5.1 Position of the priority projects under review of development finance

As mentioned above, CBN's on-lending program loans account for about 60% of all agricultural financing, so it is unlikely that new loans will suddenly be stopped or management of existing funds will be transferred to an organization other than the CBN, as it could result in a so-called "hard landing" with serious negative impacts on the agricultural sector. On the other hand, it is likely that it will take several years or more to establish a system that will enable a DFIs take over the whole development loan balances as suggested by the National Rice Development Strategy II of FMAFS.

Taking these points into account, it is recommended to achieve a "soft landing" toward the goal of optimizing the composition ratio of banks' private funds, policy finance (development finance), and cooperative finance, etc. It is considered necessary to maintain CBN's intervention funds for the time being. It is desirable that proposed priority projects in the financial field take a direction that contributes to the upgrading of agricultural finance during this soft landing process and to the creation of its optimal design (see the figure below).

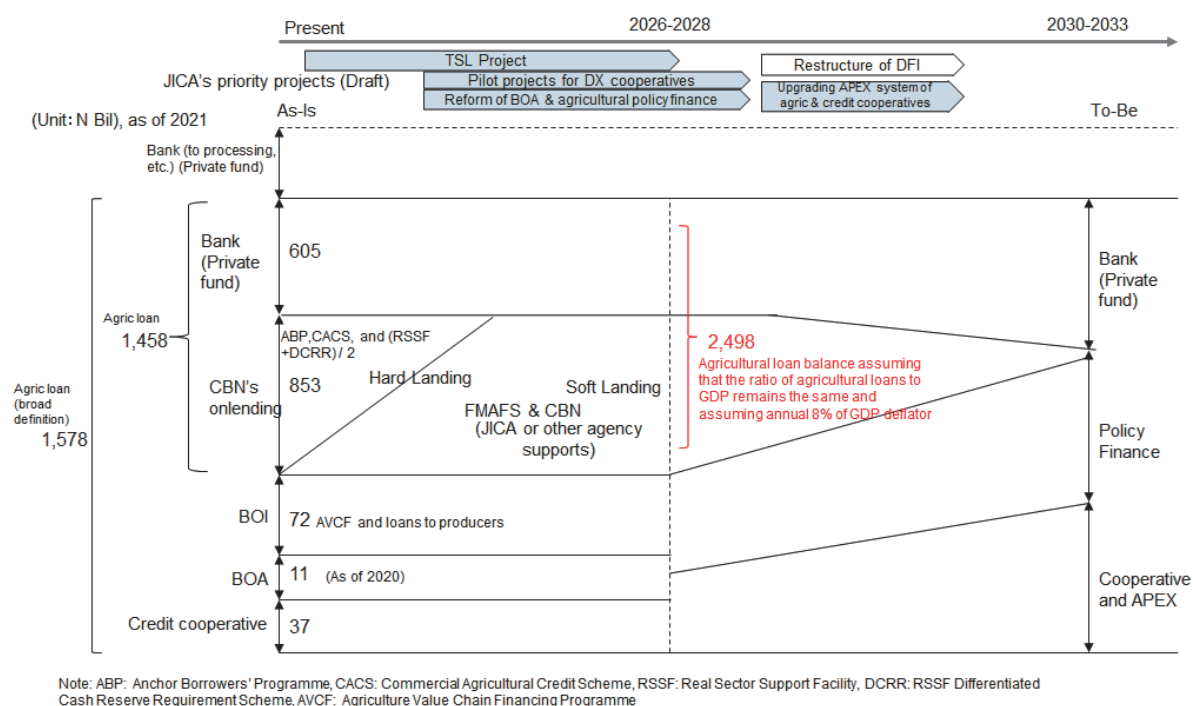
The left side of the figure below shows the current estimated balance of agricultural finance in private funds, development finance (CBN on-lending, BOI, BOA), and cooperative finance. Currently, the proportion of loans from the CBN's on-lending is large, and the proportion of policy finance (DFI) and cooperative finance is small. The right side of the diagram is an image of the ideal state where banks (private funds), policy finance, and cooperative finance complement each other in a well-balanced manner. Over a period of about 10 years, the total amount of outstanding loans is likely to increase considerably due to economic growth and price increases. For example, as shown in red at the midpoint of the figure (2026-2028), the narrowly defined agricultural loan of N 1,458 billion as of 2021 is expected to expand to around N 2,498 billion at the midpoint.

JICA's TSL primarily addresses issues in the agricultural sector and aims to improve farmers' incomes, but at the same time, in order to achieve a soft landing for agricultural development finance, it will contribute to improvements of the on-lending program loans towards an intermediate point.

The second priority project, Pilot projects on DX of cooperatives, addresses issues in the agricultural sector such as efficient extension services, visualization of the benefits of farmer participation in cooperatives, and efficient and transparent management of cooperatives. It is positioned to conduct a pilot project using DX to verify those issues and link it to the rebuilding of the APEX system. However, at the same time, this pilot project also shall examine the state of cooperative finance centered on credit cooperatives, and define the scope and characteristics of credit cooperatives in the rebuilding of cooperative APEX, and contribute to establishing the optimal form of agricultural finance.

The third priority project, Reform of BOA and agricultural policy finance, is positioned as a priority action for FMAFS and the CBN. As already mentioned, BOA's current financial situation is deteriorating and it is not able to fully perform its functions, and that the government is therefore considering increasing BOA's capital. The FMAFS Minister's priority actions, based on the new administration's strategy, also prioritize BOA reform and emphasize the enhancement of BOA's ICT functions. According to BOA, the first step is to revamp the core banking system. Based on this background, this

project will make BOA reform a priority project in the financial sector. It shall review the BOA's business implementation method, and support the design of a new core banking system based on this review.



Note: ABP: Anchor Borrowers' Programme, CACS: Commercial Agricultural Credit Scheme, RSSF: Real Sector Support Facility, DCRR: RSSF Differentiated Cash Reserve Requirement Scheme
Source: JICA Survey Team estimates the data based on various sources, and it highly depends on subjective assumptions.

Figure 3-16 Restructuring of Development Finance and the proposed priority projects

- Overall picture and synergistic effects of priority project proposals

Many of the issues at each stage of agricultural VC are related to the activities of the private sector, such as farmers, producers, and small and medium-sized enterprises, during the production and post-harvest stages. TSL intervention is effective because the biggest constraints on private sector investment are the high interest rates and the short-term and inflexible lending period. Furthermore, based on the lessons suggested by existing on-lending schemes such as ABP, the project will provide consulting services to improve farmers' financial literacy, improve lenders' monitoring capabilities, develop the organizational capabilities of anchor companies, and provide technical cooperation to improve financial products based on these issues.

Another factor hindering farmers' ability to raise funds is that cooperative organizations are not functioning adequately. Under these circumstances, many startups (SUs) in Nigeria are providing quasi-agricultural cooperative functions using their own business models to organize and support small-scale farmers and small-scale cooperatives. In Nigeria, SUs that provide quasi-agricultural cooperative functions are developing as autonomous businesses compared to neighboring countries. The TSL project will work with SUs and traditional anchor companies to ensure benefits for smallholder farmers.

However, traditional agricultural cooperatives, to which the majority of farmers belong, are weak at

the primary society level, with little capital accumulation, and the benefits of the APEX system to primary society are limited. Re-strengthening cooperatives requires establishing efficient and transparent management standards using digital tools. This also helps member farmers realize the benefits of organizing and restores farmers' trust. This will then lead to the re-establishment of the APEX system to support lower-level organizations, based on legal power and financial base backed by contracts.

Furthermore, the BOA, which is supposed to help farmers access finance through direct loans and loans through cooperatives, is currently in financial trouble as its loan portfolio shrinks. The BOA reform project is responsible for the PMO (project management organization) for business reform and the design, ordering, and implementation of the core banking system in response to the federal government's policy of increasing BOA's capital and utilizing DX. .

Table 3-94 Overview of priority projects on agricultural finance

Projects	Outline	Relevant priority actions*
(1)TSL Project for agricultural sector	• Provide low interest loans to i) farmers, ii) cooperatives, iii) anchors, iv) suppliers, etc. The following interventions are conducted by using the TSL as leverage. • Develop commercial literacy of farmers through SHEP training involving private sectors and onsite coaching, supported by ToT of ADPs. • Coordinate with start-ups which allocate rural managers and POS agents of banks for coaching, extension and monitoring farmers. • Facilitate linkage of farmers to anchor companies through improved contract farming agreement. • Develop loan instruments to preapprove credit facility in advance of the farming season	• Promote urban agriculture that is technology-enabled and especially driven by innovations and the passions of our teeming youths; • Up-scaling and Out-scaling of various agricultural value chain projects • Establishment of new food storage ventures across • Promote viable agricultural mechanization enterprises
(2)Pilot projects on DX of cooperatives	• Conduct pilot projects for cooperatives in coordination with National Adopted Village for Smart Agriculture (NAVSA) by NITDA. The selection of the pilot targets major commodities including grain, vegetables, livestock, poultry, and aquaculture. • This shall improve efficiency of extension services, access to mechanization and finance and to discover the best practice.	• Develop and promote a performance based agricultural extension system; • Development of digital/ICT Mobile-based Agro-industry System and E-extension platforms
(3)Reform of BOA and agricultural policy finance	• BOA needs restructuring of business procedures backed by advanced IT system including replacement a legacy IT system by a standard core-banking system. • This project supports improvement of business procedures of risk management, loan procedures and digitalized loan products responsive and in line with policies of FMAFS. • Also support BOA in designing business and technical requirements of the new core banking system, and help bidding and development of the system by IT vendor.	• Using Fintech solutions, wallets shall be created for all financial disbursements to deliver directly to the targeted end users. Priority shall be given to the use of digital and DEFI solutions to reform BOA and NAIC
(4)Upgrading APEX system of agricultural and credit cooperatives	• Organization of small scale farmers do not work well partly due to failure of APEX system to support primary societies and farmers. • This project shall support FMAFS to redesign the APEX system for agriculture and credit societies	• Development and promotion of cooperative models for impactful agricultural development across the various agriculture value-

Projects	Outline	Relevant priority actions*
	by As-is and To-be method in consideration of the best practice in the world.	chains

*Priority actions stated by the Minister of Federal Ministry of Agriculture and Food Security in October 2023.

3.5.2 TSL Project for agricultural sector

Name Priority project: TSL Project for agricultural sector

Duration: 5 years

Implementing agency: CBN, FMAFS

Scheme: Yen loan, Consulting service

Project overview:

The Nigerian government's previous projects, ABP and CACS, boosted agricultural lending to some extent, but they also faced issues such as the misuse of some funds for other purposes and low repayment ratios for farmers. In light of these issues, this project will provide funds through TSL to support the interest rate level and repayment period required by potential borrowers such as agricultural producers, and will also use this funding as an leverage to support agricultural producers using SHEP as an entry point in the consulting service for improving farmers' financial literacy and linkage with agricultural VC companies. On the lender side, the project will promote financial access through start-up's support services, support banks (and credit guarantee systems) to improve their ability to provide products, and support monitoring of target projects. This project aims to improve the productivity and income of the agricultural sector, especially small-scale farmers, and will implement this through agricultural financing which is one of the key items of the Nigerian government's agricultural sector productivity improvement policy.

Project purpose:

TSL will help farmers, producers, rural small and medium-sized enterprises, etc. improve their productivity by improving the efficiency of production, post-harvest processing and rural distribution, and reducing waste by addressing the issue of agricultural finance among the issues in the agricultural sector. The aim is to contribute to increasing farmers' incomes, improving the productivity of VC as a whole, and contributing to improving food security. In addition, by creating synergies impacts with other priority projects in the agricultural finance field, it will support the transition to the optimal state of agricultural finance.

Activity overview:

PFI: Commercial Bank, MFB, BOA, BOI

Eligible projects for sub-loans:

A project that supports small-scale farmers' access to finance in the form of re-lending or in-kind provision through Anchors (anchor companies such as aggregators, post-harvest processing and storage, and agricultural product processing), startups that provide quasi-agricultural cooperative functions, excellent agricultural cooperatives (with a certain level of asset size and meeting bank loan eligibility criteria), medium- and large-scale farmers operating contract cultivation. Fixed asset investment for Anchor to expand procurement from farmers, fixed asset investment for rural supplier MSMEs to

increase their working capital and supply capacity, investment in agricultural machinery and investment in parts center or maintenance etc. carried out by the agricultural machinery platform.

Sub-borrower:

Small scale farmers, medium and large scale farmers. Micro, small and medium enterprises. A startup that provides quasi agricultural cooperative functions. Aggregators (micro, small and medium-sized enterprises involved in distribution, processing, etc.) that have VC contracts¹³⁷ with farmers and cooperatives. MSMEs of rural suppliers. Agricultural machinery platform companies and agricultural machinery investors participating in the agricultural machinery platform (see 3.6.7 for details).

KPI: Set the following KPIs.

Input	Sub-loan	Disbursed amount
	Sub-project	Investment amount
Output	Linkage of farmers ｼｼ	Number of VC contracts Number of farmers under the contract Of which female and youth
	Access of farmers to organization and finance	Credit amount to farmers, number of farmers (relending, advance in kind)
		Number of farmers trained by SHEP
Outcome	Increase of investment by farmers and producer MSMEs	Investment amount by farmers and producers Of which machinery usage
	Increase of value addition of farmers and producer MSMEs	Increase of unit yield Increase of gross profit of farmers
	Value addition on the agricultural value chain	Increase in operation ratio and sales of processing companies

Estimated project period: 5 years (yen loan 25 years)

Estimated project cost (Tentative): Loan component: 30 billion yen. TA component: 500 million yen

Target area: Nationwide

Beneficiaries: Farmers, SMEs, agricultural VC operators

Consulting service:

- Training and coaching for farmers and micro, small and medium enterprises. For small-scale subsistence farmers, SHEP training will be conducted by rural managers of partner startups and PFI agents. ADP conducts ToT to rural managers and agents.
- Promote collaboration between farmers and anchors. For TSL loans, Anchor is required a written contract for transactions with farmers. Encourage standard anchor contracts and provide legal literacy training to farmers, cooperatives, and producer small businesses.
- Conduct capacity-building training on business planning for anchor companies and supplier companies, especially small and medium-sized enterprises. Work with PFI to review business capabilities and plans and provide coaching to potential borrowers before applying for financing.
- Strengthen lenders' capacity in monitoring and agricultural financing products. Agricultural financing instruments need to be adjusted in consideration of characteristics such as natural conditions and the effects of climate change. Support PFI to develop financing instruments in

¹³⁷ Under the VC contract, the aggregator provides small and medium-sized farmers and agricultural cooperatives with access to agricultural inputs, agricultural machinery services, financial access, and post-harvest processing, guarantees purchase through prior arrangement, and provides necessary technical support. It is a transaction that promises to do something.

collaboration with NIRSAL, NAIC and other fintech companies, for flexibility in timing of disbursements and adjustments to ensure that agricultural insurance coverage is fully responsive to risk.

- Support implementing agencies and PFIs in disseminating information to agricultural organizations, stakeholders, business partners and the public. This will spread information on the TSL project, information on opportunities for farmers and small and medium-sized enterprises, its impact, and a correct understanding of the TSL project.

3.5.3 Pilot projects on DX of cooperatives

Name of priority project proposal: Pilot projects on DX of cooperatives

Duration: 4 years

Implementing agency: FMAFS, NITDA

Scheme: Project overview: Technical cooperation

Project overview:

In Nigeria, the formal organization rate of agricultural cooperatives remains at around 30% to 40%, which is one of the challenges in farmers' access to finance and commercial value chain. Many start-up companies are providing quasi-agricultural cooperative services, and success stories are emerging, but if left to profit-making businesses, there is a risk that many farmers will be left behind. Meanwhile, NITDA is currently trialing NAVSA (a digitally-based farm management system). FMAFS positions the use of digital technology to improve the efficiency of extension services and policy implementation as a priority policy. This project aims to carry out a pilot project on the management of agricultural cooperatives using NAVSA and obtain suggestions for improving the total systems of agricultural cooperatives in the future. Target crops include grains, vegetables, export crops, poultry farming, aquaculture, etc. that can be handled by NAVSA's functions. Livestock farming (particularly nomadism) will be considered as another business option.

Project purpose:

FMAFS has prioritized actions such as reforming the cooperative system, improving the efficiency of extension services by utilizing DX, and implementing and verifying policies using data. The results of this study also suggest that strengthening cooperatives will help address various issues in the agricultural sector, including farmers' access to finance, extension services, and access to commercial venture capital. It will also lead to synergistic effects with the TSL business and BOA reform project.

Activity overview:

- Support the addition of NAVSA functions to NITDA. Additional functions are expected to include the provision of market information, expansion of target items, coordination of material procurement and material purchase financing, sales coordination, farmland mapping, and expansion and maintenance of statistical information necessary for extension services. In addition to supporting the definition of these business requirements, it also support the IT development management.
- Assist in recruiting, evaluating, and determining pilot participants. It will approach the state

government and LGA cooperative departments and solicit proposals from societies and unions.

- Support and promote pilot implementation.
- Compile the evaluation of the pilot project and present the results. The states where the cooperatives are located as well as Abuja.
- Develop a plan for APEX system reform. To this end, it will support the establishment of a working group that will regularly consult with FMAFS, FDC, CFAN, and cooperatives' offices in pilot states.

Estimated project cost: 450 million yen (NITDA's budget will be used for additional function development, but the need for support will be discussed with NITDA)

Target area: Abuja, state with risk level 2

Beneficiaries: FMAFS, NITDA

3.5.4 Reform of BOA and agricultural policy finance

Name of Priority project proposal: Reform of BOA and agricultural policy finance

Duration: 5 years

Implementing agency: FMAFS (BOA), CBN

Scheme: Technical cooperation

Project overview:

BOA is a development financial institution that supports farmers' access to finance through direct loans to farmers and loans through cooperatives, but its current financial position is weak and it is difficult to expand its business. The Nigerian government has positioned BOA reform as a priority policy and says it will promote BOA's digitalization. BOA is planning to renew its core banking system. This project will support the reform of BOA's management and credit business, and support the bidding, ordering, and implementation management of the core banking systems that reflect the reforms to address the issues BOA faces. The Nigerian government has indicated a policy of reviewing the development finance system. If specific steps for the review are presented in the future, this project will consider and support restructuring the overall development finance system, drawing on the experiences of Japan and other countries.

Project purpose:

In addition to agreeing on direction towards the optimal form of development finance (building a consensus on the ideal form and roadmap) among the relevant parties, it will support decisions regarding BOA's positioning, functions, scale, channels, ICT functions, etc. within that framework. It will then support the development of ICT that enables these functions and support the implementation of the federal government's policy priorities of reforming the BOA and responding to digitalization.

Activity overview:

- Supporting the establishment of consensus regarding the form of development finance.
- Supporting regulations regarding the functioning of development financial institutions. Support decision-making by referring to the current situation and best practices from other countries.

- Define business requirements for BOA's business, particularly customer management, loan operations (data warehouse, portfolio risk management, screening process, screening criteria, loan conditions, monitoring, etc.), general ledger, internal controls, and auditing.
- Define system requirements (app, hardware, network) based on business requirements.
- Preparation of bidding documents, holding bid briefing sessions, evaluation of proposals, and support for selection.
- Supporting developers in managing their development work.
- Confirmation of conformity upon delivery of software and hardware, etc.

Estimated project cost: 560 million yen¹³⁸

Target area: Abuja, Kaduna

Beneficiary: BOA

¹³⁸ The actual amount of Functional Strengthening and Business Re-engineering and Implementation Management of the State Bank of Vietnam components of the World Bank's Financial Sector Modernization and Information Management System was used as reference.

3.6 Proposal on TSL Project

3.6.1 Lessons from ABP and specific issues of agricultural finance

In 3.4, we summarized the issues of agricultural finance, but below we will consider improvement measures based on the lessons of ABP and CACS, which are similar schemes to TSL.

(1) Farmers' financial and commercial literacy

According to rural socio-economic surveys and interviews with farmers, many farmers would like to make investments to expand production and improve productivity if possible. On the other hand, many farmers do not have the knowledge or experience to raise funds from financial institutions and manage their farming operations. .

In ABP, there were cases in which farmers mistook loans for grants from the government and did not recognize their obligation to repay them, and cases in which farmers engaged in side selling contrary to the agreement, resulting in deteriorating the relationship with anchors which provided farmers with materials in advance, which also affected repayment performance. On the other hand, the repayment ratio was high for farmers participating in startups and export products for which there was already a trading base. This suggests that unorganized farmers, especially subsistence farmers, need motivation and awareness before participating in commercial transactions. As an improvement measure for TSL, small-scale subsistence farmers should be given SHEP training and then encouraged to participate in commercial transactions with anchors.

Rural socio-economic surveys also suggest that by participating in groups and experiencing contract farming, farmers may be able to improve their financial literacy and have a better idea of concrete investment plans.

(2) Banks' capacity of management and monitoring

Commercial banks, which have few branches in rural areas, find it financially difficult to monitor individual farmers. As a result, there was a delay in responding to borrower farmers who had fallen behind in repayments, leading to cases where the number of non-repayments increased. On the other hand, some commercial banks had seasonal managers in rural areas, which resulted in high repayment rates. Also, the repayment ratio was higher when going through startups¹³⁹. The CACS evaluation report points out that lenders' ability to obtain information in a timely manner is an area for improvement. Based on these suggestions, TSL utilizes bank agents. In addition to providing guidance on financial literacy, which is part of the agent's main job, the agent will support the implementation of the above-mentioned SHEP training, timely coaching, and monitoring of farming conditions and repayments¹⁴⁰. The startup's rural managers will also receive SHEP training of trainers in addition to their main job of

¹³⁹ According to interviews, when Babbangona is the anchor, the repayment rate is 99%.

¹⁴⁰ Some startups, such as Zowasel, Riby, and Hello Tractor, are already collaborating with bank agents and using them as agents for farming-related advice and agricultural machinery services. AgroMall has also developed a concept called BANK OF AGRICULTURAL TRANSFORMATION (BoAT) and plans to utilize Bank Agent in an organizational manner.

farming management¹⁴¹. To this end, we will conduct ToT for bank agents and start-up rural managers with the cooperation of ADP.

(3) Anchor company linkage issues

Some loans under ABP and CACS are said to have used for other purposes. The CACS evaluation report also points out cases of mismatch between business plans and financial plans. In ABP, when the state government or association was the anchor, the repayment rate from farmers was sometimes lower. These problems have been resolved since the introduction of the prime anchor model (a model in which the anchor is responsible for repayments) under the ABP guidelines. The CACS evaluation report also states that funds were effectively utilized in VCs supported by startups. Based on these suggestions, TSL emphasizes the use of funds through startups, promotes cultivation contracts between anchor companies and producers, provides training on model contracts for farmers and small and medium-sized producers, and promotes cultivation contracts between anchor companies and producers. It also provides training and coaching on business planning and financial planning, especially for small and medium-sized enterprises. In the TSL project proposal, state governments will not be subject to anchoring, and those for associations (legally companies) will be checked individually.

(4) Loan functions and product characteristics

The CBN's 50% loan loss sharing, which is ABP's unique support method, particularly allowed moral hazard among borrowers. In addition, as a result of the timing of loan disbursement being delayed, there were cases in which funds were not available in time for planting, making it impossible to prepare funds for repayment. Furthermore, there were cases in which the rules for own funds and in-kind contributions that producers were required to provide were not followed. Based on these lessons, first of all, when sharing the risk of bad debts, existing credit guarantees with management capabilities such as NIRSAL should be used. Regarding the timing of loans, there are many voices in the Rural Economic and Social Survey that request flexible financing. It is conceivable that commercial banks, NIRSAL, fin-tech companies, etc. will develop products based on the credit guarantee pre-approval and commitment lines seen in other countries, including Japan.

Table 3-95 Lessons from ABP and CACS and the solutions

Category	Issues	Suggestion for improvement	Solutions
Farmers' literacy	Lack of mind for repayment of loans. Commit a side-selling.	Grain farmers affiliated with SU and farmers in export VCs have high repayment rates. Unorganized small-scale subsistence farmers should be targeted for finance only after motivation and literacy	Small-scale subsistence farmers shall be connected to VC literacy training after undergoing SHEP training.

¹⁴¹ Startups that support farmers with functions similar to those of agricultural cooperatives often place managers in rural areas, with each manager providing guidance and management to, for example, around 150 farmers.

Category	Issues	Suggestion for improvement	Solutions
		development.	
Monitoring capacity of banks	Commercial banks are not able to monitor small scale farmers due to irrational costs.	Banks that assigned specialized managers (seasonally employed) in rural areas witnessed higher recovery rates. The repayment rate via SU is also high. Timely information collection is a key (CACS Evaluation report).	Utilize SU field managers and bank agents for SHEP training and other coaching, which will disseminate SHEP method through private sector.
VC linkage and anchor firms	Allowed use of funds for other purpose. Mismatch between business plan & funding. Management of State Gov. and some association was issue.	Improved after introducing Prime Anchor Model. VC through SUs enabled effective use of funds (CACS Evaluation report).	Support linkage between anchor firms and farmers & producers. Do not target State Government. Associations shall be reviewed by a consultant.
Function and products of lending	50% of risk sharing by CBN raised moral hazard. Delay of disbursement made farming unable for rain-fed farmers. Minimum equity requirements were sometimes difficult to comply with due to lack of accumulation. Farm size was sometimes overcounted.	NIRSAL's credit guarantee (operated independently) shall be used rather than CBN's risk sharing. Learn from foreign loan products of foreign countries such as Japan (Pre-approved facility of credit guarantee and commitment line). Mistakes in understanding farmland were corrected through the use of GPS according to the new guidelines.	Support introduction of loan products linked to credit guarantee systems. Learn from best practice of the world.

Source: Prepared by the survey team based on interviews, CACS evaluation report, etc.

Table 3-96 Comments to ABP and CACS in interviews with banks

Bank	Comments
A	- ABP is imposed and aimed at small scale farmers. We did not participate ABP because monitoring was not possible. - CSCA is working well because it was decided through discussion between CBN and PFI. - ABP's 50% guarantee is a gray area.
B	- ABP delinquency is less than 5%. I think it depends on the bank's ability. CACS is good at 3%. RSSF is also good. - In the case of small-scale farmers, project managers will monitor. Hire from outside a person with expertise mainly in agronomics and finance.
C	- ABP performance is poor. For example, a situation may have arisen in which a farm claimed to have 500 hectares of farmland, but in reality it was much smaller. However, this was before the second guideline (mandating agricultural land mapping using GPS) was put in place. - The suspension of production activities due to COVID also affected ABP's performance. - CACS and RSSF are similar to banks' regular loan schemes and are being implemented smoothly.

D	- Three years after the start of ABP, CBN guidelines prescribed a prime anchor model (anchor companies borrow and are responsible for supporting farmers). Even so, 80% of the total loan amount is thought to be for farmers. - CACS is good because it targets businesses where small-scale farmers already have a market.
E	Examples of interventions: (i) Intervened in the selection of IT service providers (because of this, the work was done without taking into account the rainy season in each region, and as a result, disbursement could not be completed in time for the planting period. (ii) Farmers' own financial requirements (10% or more investment) was interpreted flexibly. (iii) Introduced Commodity Association (in Commodity Association Model).
F	The NPL ratio for CACS was 0.47%, and for ABP with a start-up as the anchor, it was 0.1%.

Source: Made by Survey Team based on interviews.

Those lessons discussed above is also an input to the TSL project design.

3.6.2 Overview of TSL project

(1) Background and objective

The agricultural sector suffers from inefficiencies such as (1) low unit yield, (2) high post-harvest loss ratio, (3) high cost of transportation, and (4) low value addition out of agricultural products. The root causes of these inefficiencies are, in overall, insufficient investment by producers and public investment for physical and soft infrastructure.

- For example, unit yields of crops such as rice, yam, cassava, millet, cocoyam, potato, soybean, cowpea, tomato, other vegetables, cocoa, and cashew are lower than the average of neighboring countries.
- In addition, post-harvest loss is higher than the average for neighboring countries for crops such as rice, potato, cocoyam, plantain, tomato, other vegetables, cowpea, cacao, groundnut, and sesame.

The fundamental causes of these inefficiencies include producers' reliance on traditional farming methods, insufficient physical and institutional public infrastructure, and insufficient investment in the agricultural sector. From perspective of private sector, producers in particular, there is a considerable room for improving yields by encouraging producers to make appropriate investments. However, access to finance is difficult for small-scale farmers, who make up the majority of producers.

The reasons on the part of the borrowers (farmers) include (1) insufficient financial and commercial literacy¹⁴², (2) under-organization, and as a result, (3) they are unable to secure appropriate linkages to the value chain which would enhance their trustworthiness from view point of lenders¹⁴³.

To deal with this situation, TSL is implemented to provide funds at lower interest rates than usual and with the necessary repayment period, increasing farmers' financial access not only through direct loans but also through cooperatives and anchor companies. Promoting credit to farmers can encourage appropriate investment by farmers. However, from the lessons of ABP, funding alone is not enough. Leveraging advantageous funds, technical support will be provided to (1) improve farmers' literacy, (2)

¹⁴² It was pointed out that farmers participating in ABP were not aware of their repayment obligations and that side selling was rampant. Furthermore, the rural socio-economic survey revealed low recognition of financial products, including loans.

¹⁴³ Financial institutions will find it easier to evaluate farmers' crops if a reliable business is planning to purchase them.

ensure stable trade through appropriate trade contracts with processing and other anchor companies, and (3) promote investment in post-harvest processing facilities. This will help improve the productivity and income of small-scale farmers, and encourage autonomous reinvestment and expanded reproduction. Furthermore, as a medium- to long-term ripple effect, it is expected that PFI will strengthen its ability to originate agricultural loan projects and sustainably organize small-scale farmers.

For small-scale farmers who are mainly self-sufficient, it is effective to use SHEP training as a starting point to motivate them, but ADP resources are limited. For this reason, the TSL project aims to expand reach by utilizing private sector resources. Leveraging TSL's low-interest funding, the startup's rural managers and bank agents will be used as resources to help farmers improve their financial and commercial literacy. .

(2) Nigerian government policy

The federal government's National Development Plan (NDP) sets goals for the agricultural sector by 2025 to increase agricultural productivity and contribute to economic growth and food security. One of the KPIs of NDP is to increase the ratio of agricultural loans to the loans to private sector. The Agricultural Technology Innovation Plan (NATIP2022-2027) of the Federal Ministry of Agriculture and Food Security (FMAFS) confirms the effectiveness of approaches such as VC development that have been focused on in recent years, and deploys new technologies to improve the potential of the agricultural sector. In the field of agricultural finance, it also calls for improving the capacity of BOA and NAIC.

The agricultural loan ratio remained at around 3.5% to 4% in the first half of the 2010s, but has increased since 2017 and reached 6% as of 2021. The increase during this period is due to CBN's on-lending program loans such as RSSF (started in 2014, for companies in the manufacturing industry, agriculture VC companies, and service industries), ABP (started in 2015, for financing agricultural production), and RSSF-DCRR (started in 2018, aimed at large companies and startups in the same industry as RSSF). The total balance of these three on-lending program loans as of 2021 is N925 billion, which is almost the same amount as the increase in agricultural loan balance between 2015 and 2021, which is N 1,009 billion. In the case of RSSF and RSSF-DCRR, not all loans fall under agricultural loans, but as a ripple effect of increased investment by agricultural VC companies, loans for agricultural production funds are thought to have increased to some extent.

On the other hand, the agricultural sector's GDP ratio declined in the mid-2010s, but has increased through 2020, and it appears that the increase in the agricultural loan ratio has contributed to an increase in the added value of the agricultural sector to some extent. In other words, it can be said that agricultural finance policies have had an effect on the growth of the agricultural sector. However, in order to achieve the NDP's goal of achieving a 10% agricultural loan ratio, increase of additional 4% is needed. In terms of amount, based on private sector loans in 2021, the agricultural loan balance needs to increase by N975 billion¹⁴⁴.

¹⁴⁴ Considering the trend of increasing private sector loans, the amount of increase in agricultural loans required over the five years from 2021 will be even larger. This point in details will be discussed later.

(3) Japan's aid policy

JICA has organized three priority areas and five development issues as the direction of development cooperation for Nigeria, and has drawn up seven cooperation programs that correspond to each development issue. The “Agricultural Development Program” has been set as the top priority program in “Industrial Promotion and Diversification”, which is a development issue under one of the priority areas of “Building the foundation for a sustainable and resilient society for economic growth”. Under the program, cooperation is being undertaken in several projects related to the “Coalition for African Rice Development” (CARD), the “Smallholder Horticulture Empowerment and Promotion” (SHEP), and the “Africa Field Innovation Center for Agricultural Technology” (AFICAT). In addition, under one of the priority programs, “Business environment improvement and innovation promotion program” there is NINJA (Next Innovation with Japan) initiative, which supports the development of startups and their collaboration with Japanese companies.

In the other priority area of “Building inclusive and resilient health and medical systems”, the “Nutrition and Hygiene Program” is being implemented under the development issue of “Health and medical system strengthening”, where “Project on Capacity Development for Nutrition Improvement in Federal Capital Territory (Initiative for Food and Nutrition Security in Africa (IFNA) related project).

This project aims to have synergistic effects with SHEP and CARD projects by promoting the stage-up of farmers through SHEP training, and with CARD projects and AFICAT by providing financial support for agricultural machinery investment. In promoting financial access through start-ups performing farmer support services, this project will seek synergy and collaboration with the NINJA initiative. Additionally, there is a synergistic effect between the consulting services provided by this project, including support for farmers' household budget management and financial literacy, and IFNA-related projects.

(4) Supports of other aid organizations

Existing TSL for development purposes includes a scheme in which the Development Bank of Nigeria (DBN) is the implementing agency and commercial banks are the PFIs, with funds provided by AfDB, AFD, IBRD, etc., but the purpose of the DBN is to provide financing for small and medium enterprises, and not to target the agricultural sector. There is also TSL schemes, which foreign development financial institutions provide direct loans to Nigerian commercial banks, but these are also aimed at supporting small and medium-sized enterprises and women's employment, and are not aimed at the agricultural sector. In addition to TSL scheme, GIZ conducts projects to support the investment activities of small-scale farmers, but it does not provide funds, but rather the affiliated MFB provides loans at regular interest rates. As mentioned above, there is no overlap with this project.

On the other hand, it is possible to collaborate with small and medium-sized enterprises, which are funded by other aid organizations, and that procure from farmers and agricultural cooperatives supported by this project by using TSL under the same PFIs. Furthermore, SAPZ, which is being conducted mainly by the AfDB, recognizes that raising funds for companies that will use the processing centers it develops is an issue, and synergistic effects are expected from collaboration with this TSL project. .

(5) Necessity and relevance

As mentioned above, this project aims to improve the productivity and income of the agricultural sector, especially small-scale farmers, and will implement this through agricultural financing, which is one of the important policy measures of the Nigerian government's agricultural sector productivity improvement policy.

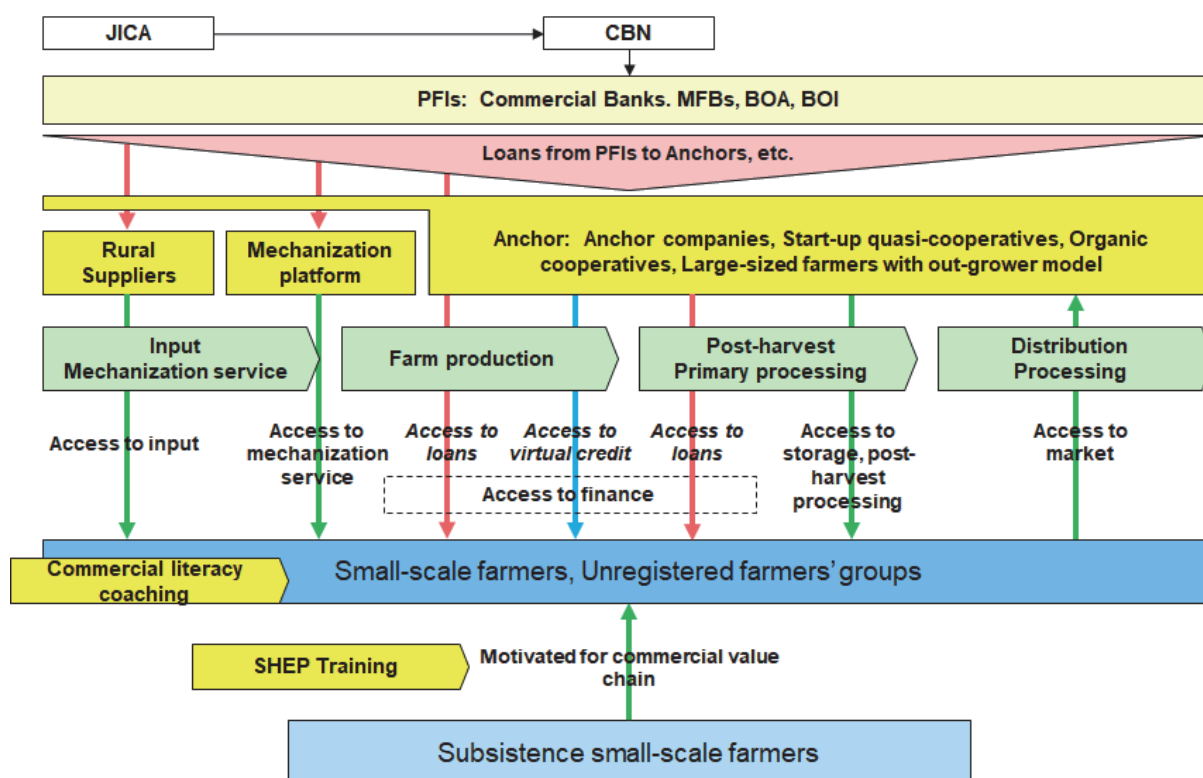
In addition, this project is positioned as part of “Agricultural development program” which is the highest priority program in JICA's development cooperation policy for Nigeria, and will utilize the assets of JICA's cooperation achievements such as CARD and SHEP under the same “Agricultural development program”. Specific synergy is extending the assets to the private sector and the entire value chain through promotion of agricultural finance. There is no direct overlap in relationships with other aid agencies, but rather they are positioned to complement each other from the perspective of value chain development.

Based on the above, it is highly necessary and relevant for JICA to support Nigeria's agricultural sector through this project.

(6) TSL's fund flow and impact flow

TSL provides low-interest funds from the implementing agency (currently assumed to be CBN) to PFI with a repayment period that matches the characteristics of the subproject. PFI provides sub-loans to sub-borrowers at low interest rates and with repayment periods and methods that suit the needs of users. Anchors (anchor companies, startups, good cooperatives (eligible for bank financing), medium-sized and large-scale farmers conducting contract cultivation, etc.) play a central role in project formation. Farmers secure financial access through direct loans from PFI, re-lending from Anchor, and credit from Anchor (advance delivery of inputs, etc.), as well as access to agricultural inputs and machinery services, post-harvest processing and storage, sales markets and markets and price information.

Farmers will receive SHEP training for subsistence farmers and commercial literacy training and coaching for linkage participation in Anchor to maximize the material impacts of their financial access.



Note: Farmers' access to finance include (i) direct lending from PFIs, (ii) relending from Anchors such as cooperatives and Start-ups in particular, and (iii) virtual credit from Anchors (such as supply of input, in-kind).

Figure 3-17 Flow of funds and impacts of TSL

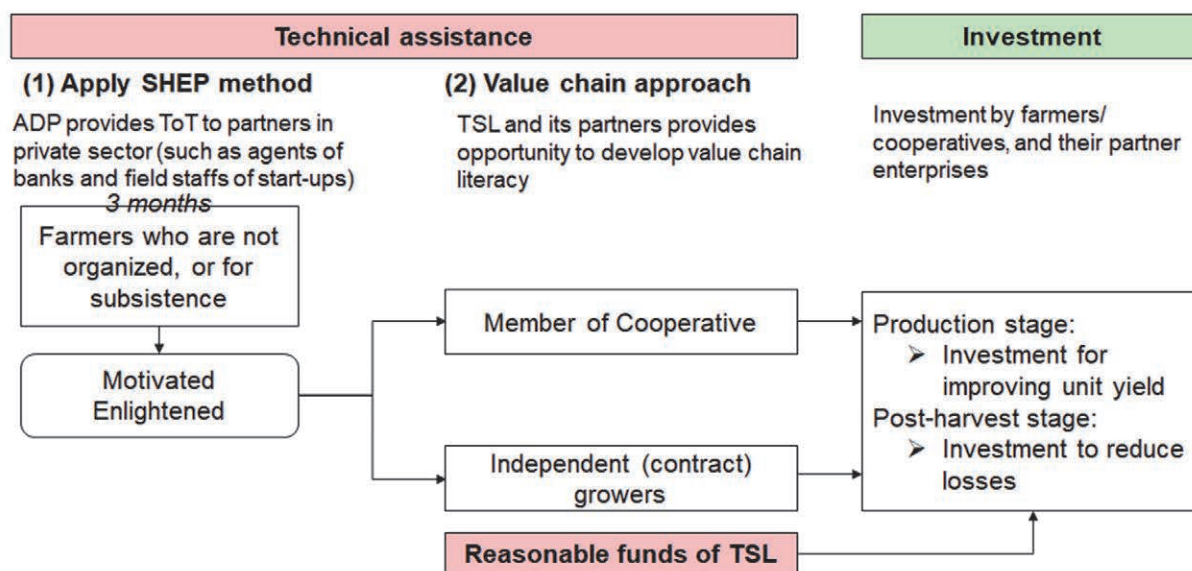


Figure 3-18 Stage up of farmers and the training

(7) Impact of TSL Project

PFIs provide loans (sub-loans) to eligible borrowers with eligible projects (sub-projects).

Sub-projects should involve small scale farmers through value chain contract (such as anchor contract, out-grower contract, and service agreement, etc.) which enables farmers access to loan or virtual credit (in-kind such as input), access to mechanization service, access to post-harvest facility, and access to market, etc.

Farmers are to increase investment such as working capital (input for farming) and fixed investment (such as small irrigation facility, transportation means, etc.) triggered by involvement in such value chain contract and/or access to finance. This behavior is supposed to increase productivity and/or production yield, and income of farmers, and encourage reinvestment.

Increased productivity and more expectable production volume would sustain/increase operation ratio of buyers of commodities such as processors, then encourage further investment and capacity of procurement of commodities. Those expected impacts shall be measured and monitored by key performance indicators (KPIs). The technical assistance will support the monitoring of KPIs by collecting the data from PFIs and field survey¹⁴⁵.

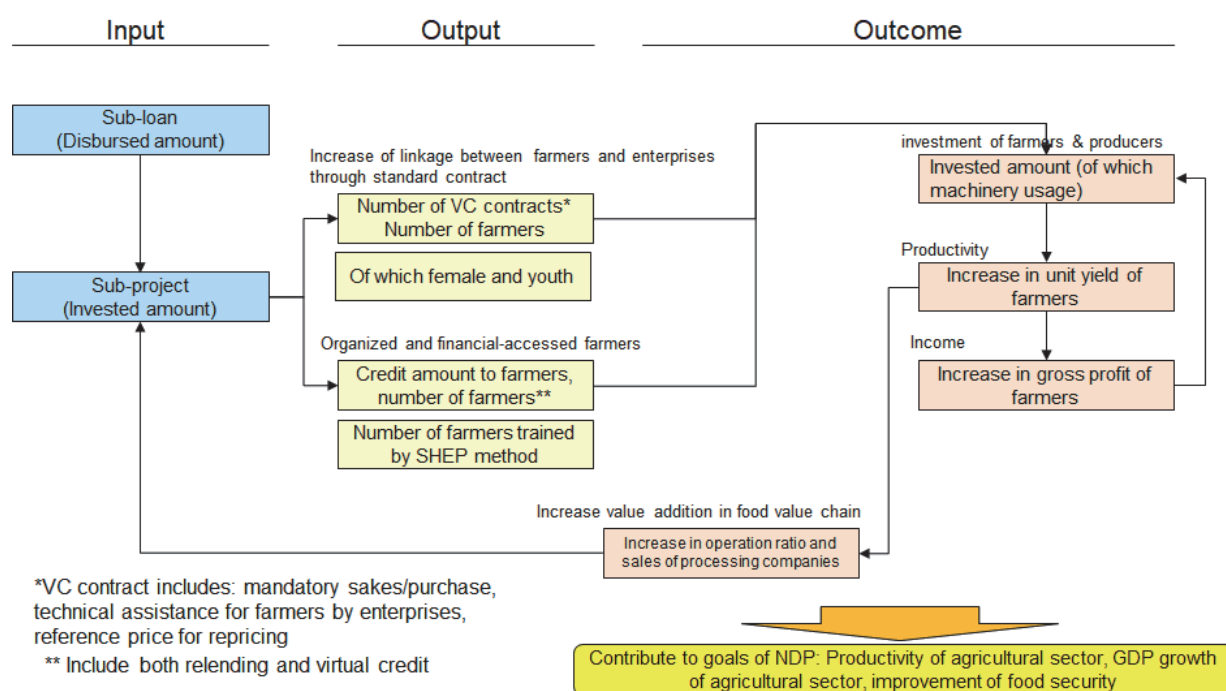


Figure 3-19 Flow of impacts and tentative key performance indicators (KPIs) by TSL

The Specific Objectives of TSL Project assume the following.

- Number of value chain contracts between farmers/farmers' groups and enterprises are added
- Number of farmers covered by value chain contracts between farmers/farmers' groups and enterprises are added
- Of which number of female and youth
- Credit amount to farmers, and number of farmers to receive credit are added (include direct lending, relending and virtual credit)

¹⁴⁵ As seen in 3.1, the results of the cash flow estimation using the data from the rural socioeconomic survey results also showed that the investment can be covered by reinvestment of funds within a few years after the initial investment.

- Number of farmers trained by SHEP method are added
- Invested amount of farmers, farmers groups, cooperatives, and SMEs are increased.
- Of which access to mechanization services in terms of hectare days (or costs paid for the mechanization services) are increased
- Unit yield or productivity of farmers, farmers groups, cooperatives, and SMEs are increased
- Income (gross profits) of farmers, farmers groups, cooperatives, and SMEs are increased
- Operation ratio and sales of processing companies are increased

3.6.3 PFI

(1) Methodology to select PFIs

Participating financial institutions (PFIs) are private financial institutions such as commercial banks and MFBs, and DFIs such as BOA and BOI. Private financial institutions will be evaluated based on evaluation criteria based on annual reports and questionnaire responses.

In this study, letters were sent to all 24 banks requesting contact information for interviews and questionnaires. For 11 of these banks, the Survey Team conducted interviews in a first on-site survey, a second on-site survey or online, and asked them to respond to a questionnaire. The Team also conducted multiple interviews with DFIs such as BOA and BOI, and asked them to complete a questionnaire. Regarding MFBs, the Team requested the National Association of Microfinance Banks (NAMB) to send the questionnaire to eight banks with national licenses and other MFBs that are active in agricultural financing to the extent NAMB knows.

Table 3-97 Information requested in questionnaire to banks

Categories	Outline of information to request
1.Basic profile	Overview profile
2.Basic figures	Total assets, Gross earnings, Loans and Advances to Customers, Deposit from Customers, Capital, Profit after tax, Loans to agricultural Sector, Non-performing Loans (NPL), Loan loss provision
3.Regulatory financial ratio	Capital Adequacy Ratio, Liquidity Ratio, Loan to Deposit Ratio, NPL Ratio (Non-performing loans to total gross loans)
4.Other financial ratio	Return on assets, Return on equity, Yields on Earnings Assets, etc.Net Interest Margin, Cost to Income Ratio, Non-performing loans net of provision to capital, Large exposures to capital, Geographical distribution of loans to total loans, Trading income to total income, Average cost of deposit
5.Agricultural finance policy	• Agricultural finance policy • Organizational structure and method for decision making of credit portfolio • Agricultural finance policy (approved by board of directors), method to diversify and manage risk • Policy for impairment due to natural calamities, and examples • Policy to promote agricultural insurance, and examples • Method to check proper utilization of loan proceeds, and examples of failure • Policy of valuation of security, and examples • Policy and facility of cash-flow based loans, and examples • Loan amount balance which are not included in Loans to Agricultural Sector but loans to processors, transportation & logistics, rental service, other services, etc. which are mainly engaged in agricultural commodities

Categories	Outline of information to request
6.Practice of agricultural finance	• Experience of preferential program loans • Loan terms and conditions by type of borrowers
7.Environmental and Social Considerations	• Policy on Environmental and Social Considerations • Screening, categorization and review procedures • Organizational structure and personnel for environmental and social considerations • Monitoring and reporting procedures • Experience in environmental and social management • Need of Capacity Development and Improvement Plan
8.Demands for TSL onlending scheme of JICA	• Current challenges in agricultural finance • Demand to participate TSL project and the prerequisites or requests of the bank

Note: Some items in the questionnaire for MFBs were deleted according to suggestions of NAMB.

Outline of the evaluation criteria is as follows¹⁴⁶.

Financial performance:

- Compliant with CBN regulatory ratios (CAR, NPL ratio, liquidity ratio).

Coverage:

- Network size: Over 150 branches and over 20,000 agents.
- Area covered: In principle, have an International or National license. However, if there are notable advantages such as agricultural loan ratio or agricultural loan conditions, a Regional license may also be eligible.

Agricultural finance strategy:

- There is a credit portfolio management system in which top management has decision-making authority.
- Recognize and manage risk factors specific to agricultural financing.
- Loan interest rate spreads are determined based on data.
- There are support measures such as loan restructuring in case repayment is difficult.
- There is a monitoring system to confirm the use of funds.

Agricultural financing:

- Assess agricultural loan ratio or agricultural loan balance (number not yet determined). If a response regarding the balance of agricultural loans in a broad definition is obtained, agricultural loans in a broad sense will also be taken into account.
- Experienced in on-lending system financing.
- There is a system in place to provide capacity building support to farmers and small and medium-sized business borrowers.

(2) Evaluation by published information (shortlisting)

Publicly available information provides figures for the CBN's regulatory ratio and outstanding

¹⁴⁶ The details are not suitable for public disclosure, so they are organized in attached documents.

agricultural loans. Of the 24 commercial banks, 15 have their 2021 annual reports available online. Of these, 14 banks met all of the CBN's regulatory ratios: capital adequacy ratio of 10% or more, liquidity ratio of 30% or more, and non-performing loan ratio of 5% or less.

Furthermore, regarding the balance of agricultural loans, 12 banks have a ratio of agricultural loans to total loans and advances for customer of 3% or more, or are in the top 10 among banks for agricultural loan balances. However, while the amount outstanding of agricultural loans as defined by the CBN is published in each bank's annual report, the amount of loans to agricultural VC companies is not published. Banks which respond with figures of loans to agriculture VC companies will be evaluated considering both types of agricultural loans.

Table 3-98 Key financial figures and agricultural loans of commercial banks

	License	Total assets	Gross earnings	Loans and Advances to Customers	Deposit from customers	Capital	NPL	Loan loss provision	Profit after tax	Loan to total sectors	Loan to Agricultural sector	Ratio of loans to agricultural sector	Capital adequacy ratio (CAR)	liquidity ratio	loan to deposit ratio	NPL ratio	Rank: Loan to Agricultural sector	Qualified by regulatory compliance (=1)	Tentatively recommended
Access Bank Plc	International	11,731,964		4,161,363	6,954,827	1,050,028			160,216	4,311,263	43,252	1.00%	24.5%	51.0%	59.8%	4.00%	9	1	yes
Zenith Bank Plc	International	9,447,843	765,558	3,501,878	6,472,054	1,279,662	146,729	175,305	244,558	3,501,878	227,237	6.49%	21.0%	71.6%	54.1%	4.19%	2	1	yes
Fidelity Bank Plc	International	3,289,479	250,774	1,658,412	2,024,806	297,769	50,244	74,132	35,579	1,732,543	71,759	4.14%	20.1%	40.4%	81.9%	2.90%	8	1	yes
FIRST BANK NIGERIA LIMITED	International	8,932,373	757,300	2,881,916	5,849,487	879,856	13,542	8,423	151,079	222,005	391	0.2%	17.4%	above 30%	49.3%	6.1%	14	1	no
First City Monument Bank Plc	International	2,493,198		1,063,589	1,554,414	243,806	45,932		20,917	1,113,158	78,907	7.1%	16.2%	34.4%	68.4%	4.1%	6	1	yes
Guaranty Trust Bank Plc	International	5,436,035	447,811	1,802,587	4,012,306	883,227			174,839	1,569,488	116,577	7.4%	25.4%	38.3%	44.9%	4.9%	4	1	yes
Union Bank of Nigeria Plc	International	2,595,769	177,269	868,840	1,355,910	266,870	38,660	25,834	19,371	868,840	30,557	3.5%	14.6%	35.0%	64.1%	4.3%	11	1	yes
United Bank For Africa Plc	International	8,541,318	660,219	2,680,667	6,369,189	804,807	88,617	118,747	118,687	2,461,583	81,719	3.3%	24.9%	65.3%	40.4%	3.6%	5	1	yes
Citibank Nigeria Limited	National															NA			
Ecobank Nigeria Plc	National	2,475,079		1,015,603	1,675,636	278,777	98,282		9,766	919,110	131,824	14.3%	11.5%		60.6%	9.7%	3	1	yes
Heritage Banking Company Ltd.	National															NA			
Keystone Bank Limited	National															NA			
Polaris Bank Plc	National	1,094,252	122,366	204,784	914,323	99,938			21,878						22.4%		NA		
STANBIC IBTC BANK PLC	National	2,742,764	206,644	946,259	1,126,535	376,866	20,338	30,654	56,966	962,361	31,157	3.2%	16.1%	105.4%	84.0%	2.2%	10	1	yes
Standard Chartered Bank Nigeria Ltd.	National															NA			
Sterling Bank Plc	National	1,629,129	142,316	711,900	1,208,753	141,491	5,083	14,180	13,515	726,080	76,727	10.6%	14.8%	37.9%	58.9%	0.7%	7	1	yes
Titan Trust Bank Ltd	National	246,236	13,626	63,066	182,383	36,390	0		4,404	63,065	128	0.2%	34.7%	67.3%	34.6%		15	1	no
Unity Bank Plc	National	538,868	50,284	269,269	322,284	276,153	118	3,119	3,173	272,468	246,609	90.5%	-86.2%	31.0%	83.6%	0.0%	1	0	no
Wema Bank Plc	National	1,175,490	93,632	418,864	927,471	70,146	21,263		8,926	435,551	20,659	4.7%	11.7%	29.8%	45.2%	4.9%	12	1	yes
Globus Bank Limited	Regional	260,136		105,385	161,961	34,832			4,401						65.1%	NA	NA		
Pariflex Bank Ltd	Regional															NA	NA		
Premium Trust Bank	Regional															NA	NA		
Providus Bank	Regional	439,804	23,735	102,876	207,894	23,626	3,557	1,543	7,091	102,876	8,230	8.0%	15.8%	74.9%	49.5%	4.7%	13	1	yes
SunTrust Bank Nigeria Limited	Regional	67,954		15,485	50,843	1,184			-1,223							NA	NA		no
Total		63,137,691	3,711,534	22,472,743	41,371,076					19,262,268	1,165,733	6.1%			54.3%				

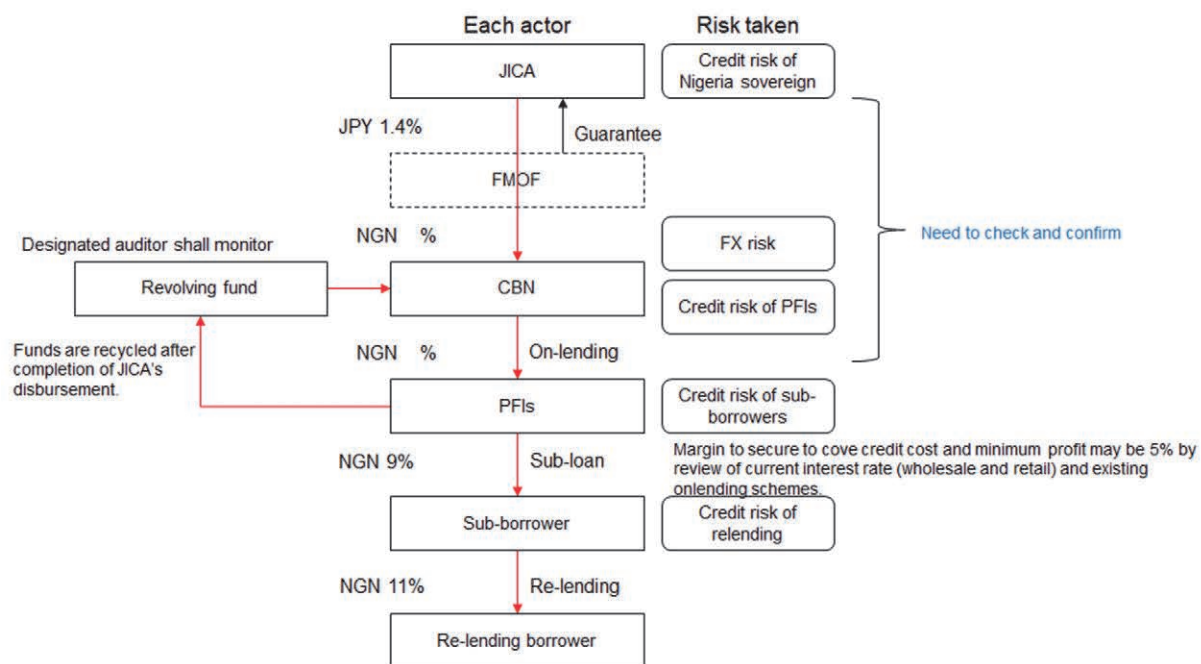
Source: Annual report of commercial banks

3.6.4 Implementation structure

Regarding the review of the development finance system mentioned in 3.4, the Survey Team has sent a questionnaire along with the concept of JICA's priority projects and reference information on the restructuring of development finance, to request CBN and FMAFS to consider the matter. High level dialogue shall be held between JICA and those relevant agencies for implementation structure. At present, the proposed structure will be described with CBN as the implementing agency.

(1) Fund flow

The flow of funds is assumed to be JICA → CBN → PFIs → Sub-borrower (→ End of borrower of relending). The Federal Ministry of Finance provides guarantees to JICA regarding credit risks to the CBN. CBN will bear credit risk to PFI and exchange rate fluctuation risk. Although PFI bears the credit risk to sub-borrowers, it is also possible to share some of the risk with a third party by utilizing the credit guarantee system. The interest rate conditions for the sub-loan will be discussed later.



Source: Created by the Survey Team based on past TSL projects, etc.

Figure 3-20 Fund flow and risk taken under TSL

Disbursement requests from CBN to JICA will be made in accordance with the “Brochure on Reimbursement Procedure for Japanese ODA Loans” and “Brochure on Advance Procedure for Japanese ODA Loans.”

(2) Project management structure

The Joint Coordinating Committee (JCC) reviews the progress of projects, reviews and advises on

the direction of TSL projects based on federal policy, and approves plans for attached technical cooperation projects (TA). Other matters that require high-level judgment will be discussed, such as responses to major changes in the economic situation, and recommendations will be made to JICA. The members of the JCC will be the Representative of JICA Nigeria Office, the Director of DFD of CBN, the representative of Governors Department of CBN, and the Director of Planning and Policy Coordination of FMAFS.

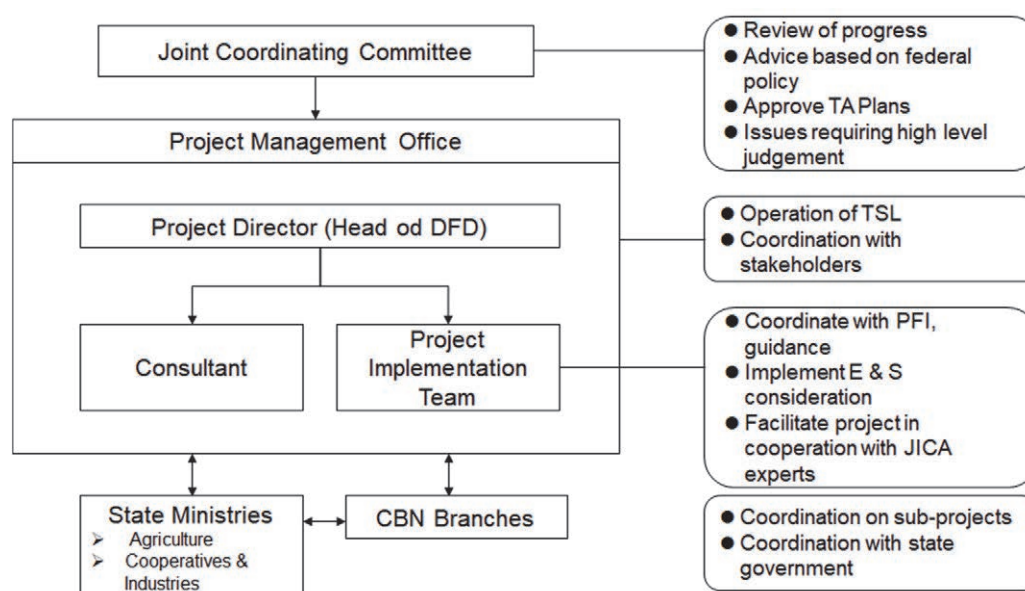


Figure 3-21 Implementation structure of TSL

The Project Management Office (PMO) will manage the TSL and coordinate with stakeholders. The PMO will be supervised by the Director of DED. The PMO performs administrative tasks including PFI management, policy implementation, and guideline formulation as well as updating, disbursement operations, fund management, capacity building and public relations, auditing, and reporting.

The Finance Department of CBN will be in charge of coordinating the flow of funds with JICA and establishing conditions with the Federal Ministry of Finance (FMoF).

Table 3-99 Role of PMO

Roles	Outline
PFI management	- Develop and manage evaluation criteria of PFIs. And monitor and supervise performance of PFIs. - Collaborate with the Banking Supervision Department of the CBN to propose, implement and manage credit limit establishment and fund allocation. In the event of changes to PFI, including merger factors, etc., PMO shall respond efficiently, including to on-lending operations and IT systems.
Policy implementation	- Develop and manage an operational guideline of TSL in line with relevant policy and regulations in Nigeria, purpose of TSL, and technical capacities of PFIs and target borrowers. - Improve and revise the operational guideline based on updated information through monitoring and supervision, if necessary.

Roles	Outline
	Coordinate with other government organizations and the assigned consultant on development policies and impact mechanism.
Guideline	- Evaluate, monitor, and supervise sub-projects and sub-loans in accordance with operational guidelines, banking regulations, JICA Environmental and Social Consideration Guidelines, and social considerations based on the actual situation of PFI and sub-borrowers. - Provide guidance to PFIs and sub-borrowers regarding financing and environmental considerations. - Conduct on-site inspections to assess compliance and project effectiveness, and obtain suggestions for improvement.
Disbursement operation	- Evaluate disburse application from PFIs and execute the disbursement in well communication with PFIs to effectively respond to financial demands of end-borrowers. - Monitor and guide PFIs so that the disbursed funds shall be efficiently used for sub-projects. - Manage fulfillment of PFIs in terms of repayment and other redemptions in accordance with an onlending agreement, and take necessary actions.
Fund management	- Develop/secure an IT system to manage a segregated account of the TSL project. - Guide PFIs to implement management and transaction of the funds in compliance with the operational guideline and relevant rules and regulations. - Monitor a revolving fund in terms of appropriate debit and credit and request funds from JICA (replenishment).
Public relationship & capacity development	- Implement publication of the TSL project to government organizations, financial institutions, farmers, and enterprises. - Disseminate impact and achievements of TSL project to the public. - In charge of capacity development pf consulting services.
Auditing	Hire a designated auditor/accountant to audit the project management unit and revolving fund to promote/verify compliance with regulations in Nigeria, rules and guidelines of JICA, loan agreement, the operational guideline, onlending agreement, sub-loan agreement, and banking regulations, etc.
Reporting	- Acquire data form monitoring system to analyze outputs and key performance indicators of TSL. - Implement reporting such as a progress report, and other reporting if requested by JICA.

Source: Made by the Survey Team

In addition, in light of the ongoing consideration over the review of development finance, a working group centered on FMAFS and CBN shall be established to coordinate FMAFS's priority policies with TSL and measure their effectiveness, especially with regard to policies regarding policy implementation. Emphasis will be placed on practical coordination regarding the exchange of opinions on the subject and coordination of targeted projects whose effectiveness will be measured.

3.6.5 Consulting service

(1) Capacity building for farmers and small businesses

Target farmers will be given priority to farmers under the Anchors, which PFI will consider as projects eligible for financing. SHEP training will be provided to small-scale subsistence farmers. In order to utilize private training resources, ADP will conduct training of trainer (ToT) for bank agents and start-up rural managers. For other farmers and the farmers who have undergone SHEP training,

consultants will provide commercial and financial literacy training necessary for participation in specific investment projects, and PFI agents and startup rural managers will provide daily coaching.

Among the startups, seven relatively large startups with quasi-agricultural cooperative business models are currently providing initial training to farmers over multiple cropping seasons. All seven companies expressed interest in taking the SHEP training ToT and incorporating SHEP training into their initial training. Furthermore, even today, there are cases in which bank agents also serve as rural managers or agents for startups. Banks are also showing interest in the SHEP approach as it will help expand agricultural loans and improve recovery rates. From this point of view, it would be effective for the private sector to provide SHEP training for sub-project beneficiary farmers as part of TSL's consulting services. However, for modules where SHEP training is to be implemented by start-up rural managers and bank agents, it is desirable to conduct trials and develop an initial version of the module in a project of Technical Assistance Grant implemented by JICA prior to start of TSL.

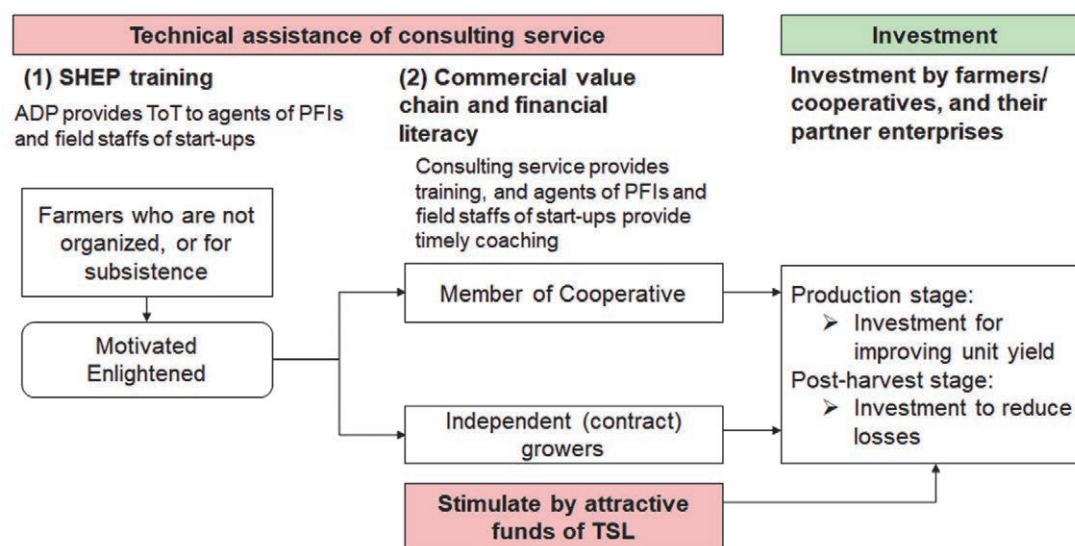


Figure 3-22 Image of collaboration from SHEP training to implementation of commercial VC/financial literacy training

(2) Strengthening cooperation between farmers and anchors

TSL's sub-loan requires a VC contract (contract farming including technical support, purchase contract, etc.) between the anchor and the farmer. Encourage standard VC contracts and provide legal literacy training to farmers, cooperatives, and producer small businesses. A standard VC contract involves the farmer selling the entire amount (or determining a minimum sales amount and allowing the remainder to be freely disposed of), the buyer (anchor) purchasing the entire amount (or introducing the sales destination), and the quality standards will be covered. This includes establishing agricultural inputs, securing agricultural inputs for farmers and producers, providing support in terms of production technology, and setting reference prices for transaction prices. Reference prices for transaction prices

include exchange prices published by AFEX¹⁴⁷, IFAD-VCDP's collaboration with the CAF Price Committee, and nearby core markets (some markets announce official prices).

(3) Capacity improvement of SMEs of anchor, suppliers, etc.

Provide business planning capacity development to PFI's potential anchor companies and supplier companies, especially small and medium-sized enterprises. The consultant will work with PFI to provide training and coaching to improve business planning and financial planning skills.

(4) Improving PFI capacity

Strengthen capacity of PFIs in monitoring and agricultural financing products. Help PFI develop financing instruments in collaboration with NIRSAL, NAIC, and other fintech companies. In particular, consider securing flexible implementation timing through preliminary screening. In addition, based on the investment patterns of farmers considered in 3.1, it will support the development of loan products by product and provide training for PFIs.

(5) Public relations

Support the implementing agency (CBN) and PFI in disseminating information to agricultural organizations, stakeholders, business partners and the public. Public relations methods include timely dissemination through SNS and linking to information dissemination based on data and facts on agricultural finance-related sites of implementing agencies and PFI.

Table 3-100 Summary of consulting services

Theme	Outline
Capacity building for farmers and SMEs	- For small-scale farmers, especially subsistence farmers, (1) SHEP training is first provided, and then (2) provide practical training for financial, commercial, and organizational issues at the stage of considering specific loan applications and financial access through anchors. - The training mentioned in (2) above will also target farmers, agricultural cooperatives, and small and medium-sized enterprises. - Training targets will be set based on requests and recommendations from PFIs, start-ups, and anchor companies considering subprojects.
ToT	- Implement ToT for the above (1) SHEP training in collaboration with ADP for PFI agents and start-up rural managers. Consultants will also conduct ToT regarding farm management and commercial transactions. - PFI agents and start-up rural managers will conduct SHEP training and provide on-site advice and management, including day-to-day farmer support.
Support for business planning	Provide support for formulating business plans and investment plans for farmers, farmer groups, and small and medium-sized enterprises considering applying to TSL. Consultant will conduct training and provide occasional coaching during the period leading up to the implementation of the sub-loan.

¹⁴⁷ In a meeting with AFEX, it was confirmed that there is no problem with using the price as a reference price for contract farming.

Theme	Outline
Support VC formulation and VC contract	• Support matching of farmers, farmer groups, small and medium-sized enterprises, and aggregators such as processing businesses that are candidates for PFI financing. Specifically, TSL project will collaborate with SAPZ and hold matching events in SAPZ implementation states. • In addition, for farmers, farmer groups, and small and medium-sized enterprises, Consultant will provide training on the details of contract farming contracts and points to keep in mind when negotiating, and provide coaching until contract conclusion.
Support agricultural finance development	• Conduct training on case studies from other countries, targeting the CBN and FMAFS, with a view to improving development finance system design and system infrastructure (credit information center, chattel registry (NCR), use of agricultural land as collateral, etc.). • Provide training and implementation support for CBN and FMAFS development finance information dissemination and public relations.
Support Implementing agency, PFI and NIRSAL in TSL implementation and loan product	• Support for evaluation and selection of PFIs. • Provide training on legal compliance for environmental and social considerations, checks and document preparation required under TSL. • Conduct training on collecting KPI information and monitoring sub-projects. • Support the development of products that reflect the specific considerations of agricultural financing (such as setting advance credit line so that loan disbursements do not fall behind the planting season). • Create a handbook on the characteristics and risks of VC for each crop type and conduct training. • Support PFI and NIRSAL's dissemination of information regarding TSL promotion and achievements.

JICA experts in charge of consulting services will assume the following positions.

- Team Leader/ Agricultural finance expert
- Farmers' development expert
- Agri business development expert
- SME development expert
- Legal expert
- Environmental and social safeguard expert
- Public relation expert
- Monitoring & evaluation expert

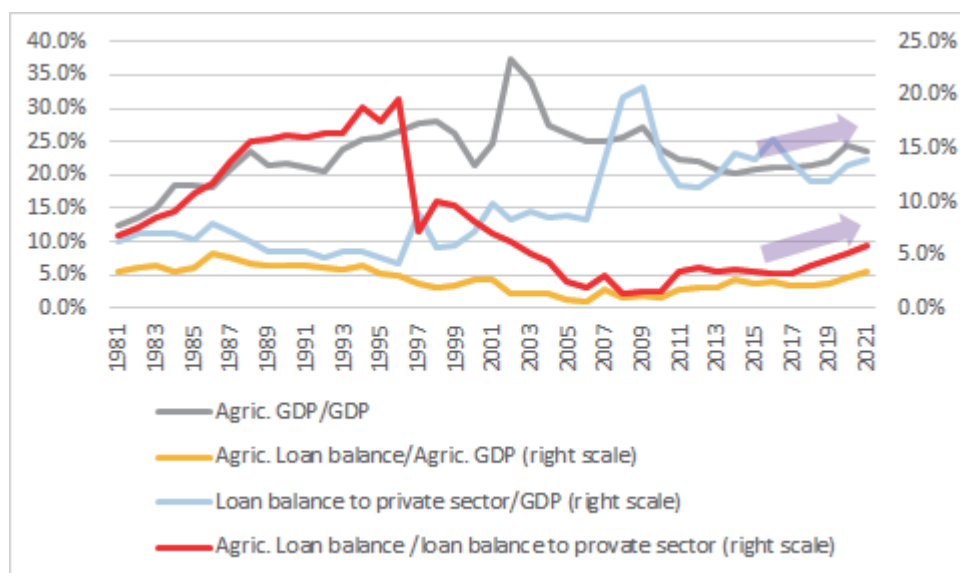
3.6.6 Financial demands and data for evaluation of loan component size

(1) Financial demands from supply side (macro finance)

The NDP has set a KPI for the ratio of agricultural loans to private sector loans (agricultural loan ratio) to be 10%. The agricultural loan ratio remained at around 3.5% to 4% in the first half of the 2010s, but has increased since 2017 and reached 6% as of 2021 (see chart below). The increase during this period is due to CBN's on-lending system loans such as RSSF (started in 2014, for companies in the manufacturing industry, agriculture VC companies, and service industries), ABP (started in 2015, for agricultural production funds), and RSSF-DCRR (started in 2018 and is aimed at large companies and startups in the same industry as RSSF). The total balance of these three on-lending scheme loans as of 2021 is N925 billion, which is almost the same amount as the increase in agricultural loans from 2015

to 2021 of N 1,009 billion. In the case of RSSF and RSSF-DCRR, not all loans fall under the category of agricultural loans, but as a ripple effect of increased investment by agricultural VC companies, it is thought that loans for agricultural production funds have also increased.

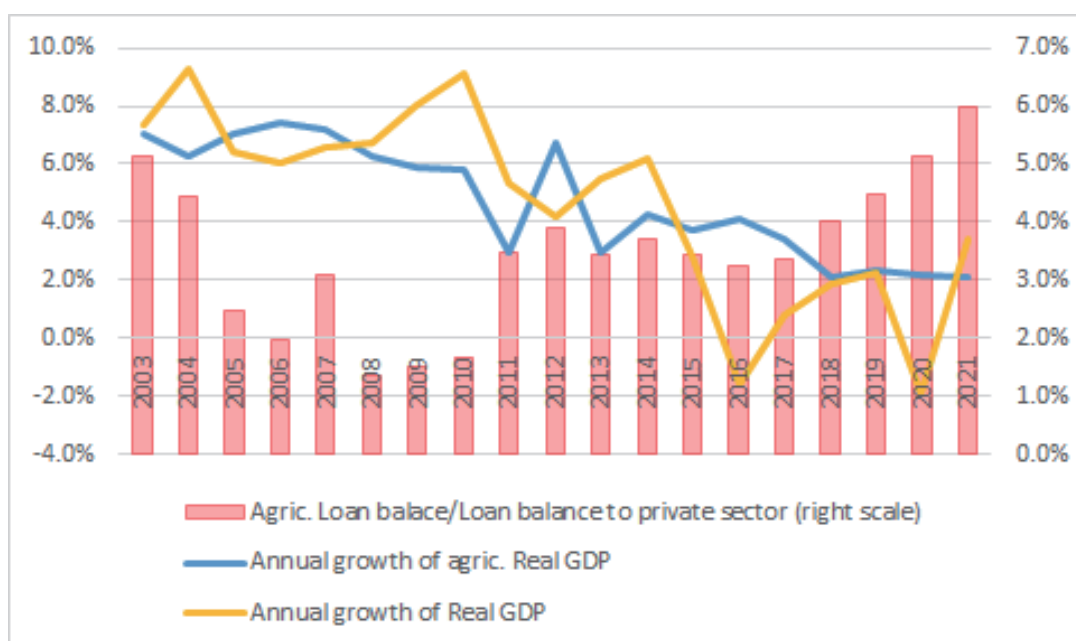
Looking at the chart below, as mentioned above, the ratio of agricultural loans to private sector loans has increased since 2017. The ratio of agricultural sector GDP to total GDP declined in the mid-2010s, but then increased until 2020. Therefore, it is thought that the increase in the ratio of agricultural loans contributed to an increase in the added value of the agricultural sector to some extent.



Source: Made by Survey Team based on CBN Statistics Bulletin

Figure 3-23 Trends in the ratio of agricultural loans to private sector loans and the agricultural sector to GDP ratio

The following figure shows the ratio of agricultural loans to private sector loans (bar graph), as well as the year-on-year growth rate of real GDP and the year-on-year growth rate of real GDP in the agricultural sector, as a line graph. Since 2015, especially in 2016, 2017, and 2020, the real GDP growth rate of the agricultural sector has been significantly higher than the overall real GDP.



Source: Made by Survey Team based on CBN Statistics Bulletin

Figure 3-24 Ratio of agricultural loans to private sector loans and the real GDP growth in agricultural sector

In this way, it can be said that recent agricultural finance policies have had some effect on promoting value added in the agricultural sector. However, in order to achieve the NDP's goal of 10% agricultural loan ratio, an additional 4% is needed. On an amount basis, based on private sector loans in 2021, the loan balance needs to increase by N975 billion, and there is a need to continue accumulating agricultural loans.

Considering the trend of increasing private sector loans, the amount of increase in agricultural loans required over the five years from 2021 will be even larger. The table below shows the increase in agricultural loan balances and private sector loan balances for each year from 2017 to 2021, the annual average increase in this period, and the balance at the end of 2021.

(N billion)

Table 3-101 Increase of Agric. Loan balance

Year	Increase of balance	Annual average
2017	2.3	186
2018	81.9	
2019	162.3	
2020	277.3	
2021	408.1	
2021balance	1,457.8	NA

Table 3-102 Increase of loan balance to private sector

Year	Increase of balance	Annual average
2017	-376.7	1,652
2018	-606.4	
2019	2,053.6	
2020	3,185.7	
2021	4,004.7	
2021balance	24,378.2	NA

Source: Based on CBN Statistics Bulletin

The trend of increase in private sector loan balance is assumed to be N 1,652 billion, which is the five-year average from 2017 to 2021. If this trend continues to increase over the next five years, the balance after five years (2026) is calculated to be N 32,639 billion ($24,328.2 + 1,652 \times 5 = 32,639$). The

target value for agricultural loans is 10% of the outstanding private sector loans, so the outstanding amount after five years (2026) is calculated to be N3,264 billion ($32,639 \times 10\% = 3,264$). Therefore, the increase in agricultural loan balance required to achieve the target is calculated to be N 1,806 billion ($3,264 - 1,458 = 1,806$).

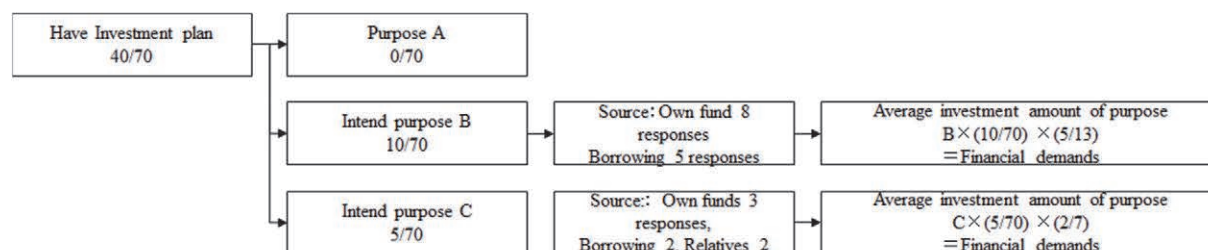
As mentioned above, the demand for funds based on the supply side of agricultural financing as a macro policy is calculated to be N1,806 billion (approximately JPY343 billion). The TSL Project is expected to contribute to some of this funding demand. In particular, in line with the objectives of the TSL project mentioned above, it would be appropriate to target sub-projects that contribute to increasing the incomes of small-scale farmers.

(2) Financial demands of farmers and MSMEs

This part will examine the breakdown of the targets of support for funding needs, namely the borrowers (TSL sub-borrowers) and the use of funds (TSL sub-projects). Below, in order of farmers, micro, small and medium-sized enterprises (MSMEs), and anchor enterprises, an estimate of the demand for funds by borrower and by use of funds based on the response results of the Rural Socio-Economic Survey and statistics on the number of farmers and businesses nationwide. The estimated demands shall be reviewed as compared with the scale of financing needs calculated from supply side, or macro policies in terms of agricultural finance.

1) Financial demands of farmers

Regarding farmers' financial needs, we investigated the investment amount and financing method (own funds, borrowing from financial institutions, borrowing from relatives and friends) among farmers who are willing to invest, for each investment objective (multiple answers allowed). Based on this data, we calculated the average investment amount for each investment objective, as well as the investment intention ratio and financial institution borrowing ratio, and calculated the amount of financing required for the farmers in the entire sample. As for the financing method, since we received responses of either "Yes" or "No" for each method (multiple answers allowed), we divided the investment amount proportionally to the proportion of the number of people willing to borrow money from financial institutions, including other methods.



Note: Figures are only for an example

Figure 3-25 Calculation method of financial demands of farmers

The results obtained using the above method are the financial needs of the surveyed sample, so the actual financial needs are calculated by multiplying by the number of farmers nationwide. In addition, depending on the farmer's participation rate in the cooperatives, the funding needs were divided into those through the cooperatives and those of individuals.

Table 3-103 Number of farmers for calculating financial demands nationwide

	Number of farmers	Ratio of cooperative members	Number of farmers under cooperatives
Crop farmers	18,176,082	44%	7,997,476
Poultry	4,823,810	0%	0
Aquaculture	350,295	25%	87,574
Livestock	12,300,000	0%	0
Total	35,650,187	23%	8,085,050

Source: Number of farmers is based on NATIONAL AGRICULTURE SAMPLE SURVEY (NASS). Cooperative participation rate is estimated by the research team.

However, for crop farmers, the composition ratio by farmland size (column (a) in the table below) is significantly different from the actual composition ratio of farmers (column (c) in the table below). The investment intention ratio by farmland size group in the socio-economic survey is shown in column (b) of the table below, and is 57% for all farmers (total of column (d)). On the other hand, if we weight the ratio of farmers intending to invest by farmland size in column (b) with the actual composition ratio of the number of farmers by farmland size (total of column (e) in the table below), it is 32% ($0\% \times 56\% + 88\% \times 24\% + 56\% \times 11\% + 53\% \times 6\% + 43\% \times 3\% = 32\%$).

In order to adjust from the sample total investment intention ratio of 57%, the calculated result was reduced by using an adjustment rate of $32\% \div 57\% = 55\%$.

Table 3-104 Sample adjustment based on farmers composition by size of farm land

Farmland size (ha)	Socio-economic survey sample composition ratio (a)	Socio-economic survey Ratio of farmers intending to invest (b)	Actual farm composition ratio by size (c)	Weighted average of the proportion of farmers willing to invest in the socio-economic survey (d)=(a)x(c)	Weighted average of the proportion of farmers intending to invest based on the actual composition ratio of farms by size (e)=(b)x(c)
< 1	0%	0%	56%	0%	0%
1-2	11%	88%	24%	10%	21%
2-4	36%	56%	11%	20%	6%
4-10	43%	53%	6%	23%	3%
> 10	10%	43%	3%	4%	1%
Total	100%		100%	57%	32%

Source: The actual number of farmers is allocated to size rank based on NASS data.

The results calculated using the above method are shown in the table below. The overall demand for borrowed funds is N 25,279 billion, but excluding farmland expansion and development, which is

thought to include investment expectations from the public sector, it is N 4,976 billion.

Table 3-105 Financial demands of crop farmers

Project	Average investment amount (N thousand)	Ratio to invest	Ratio of borrowing	Total amount of borrowing (N billion)	Through cooperatives (N billion)	Individuals (N billion)
Purchase better seed and input	1,182	10%	58%	694	305	389
Acquire machineries	2,255	33%	20%	1,492	656	835
Expand purchase of seed and input	2,466	30%	35%	2,642	1,163	1,480
Expand cultivation area within the farm	19,766	21%	48%	20,302	8,933	11,369
Expand sales outlet	515	3%	100%	148	65	83
Total				25,279	11,123	14,156
excluding expansion of cultivation area				4,976	2,190	2,787

Note: The average investment amount is calculated by dividing the total amount of farmers willing to invest by the number of farmers willing to invest in the rural socio-economic survey. Funding methods were calculated from the results of the survey using the following formula: Borrowing ratio = number of people willing to borrow ÷ total number of respondents for all financing methods.

Using the same calculation method for poultry farmers, the amount of borrowing funds required is N12.7 billion. Regarding poultry farmers, we did not adjust the sample based on farmland size.

Table 3-106 Financial demands of poultry farmers

Project	Average investment amount (N thousand)	Ratio to invest	Ratio of borrowing	Total amount of borrowing (N billion)	Through cooperatives (N billion)	Individuals (N billion)
hatchery	30,000	20%	40%	11.6	0	12
brooding facility	2,000	20%	0%	0.0	0	0
poultry house	20,000	20%	0%	0.0	0	0
slaughter and dressing facility	4,500	10%	50%	1.1	0	1
land for poultry house	11,250	20%	0%	0.0	0	0
Expand land for poultry house	14,063	40%	0%	0.0	0	0
Expand purchase of chick and input	10,314	0%	0%	0.0	0	0
Purchase better variety of chick and input	5,400	70%	0%	0.0	0	0
Expand sales outlet	1,250	10%	0%	0.0	0	0
Total				12.7	0	13

For aquaculture farmers, the financial requirement is calculated in the same way as N2.35 billion. Samples of aquaculture farmers were also not adjusted by farm size.

Table 3-107 Financial demands of aquaculture farmers

Project	Average investment amount (N thousand)	Ratio to invest	Ratio of borrowing	Total amount of borrowing (N billion)	Through cooperatives (N billion)	Individuals (N billion)
Acquire farmland	833	30%	75%	0.07	0.02	0.05
Acquire machineries	8,206	90%	75%	1.94	0.49	1.46
Expand purchase of seed and input	500	10%	100%	0.02	0.00	0.01
Purchase better seed and input	1,733	30%	100%	0.18	0.05	0.14
Expand sales outlet	2,500	10%	100%	0.09	0.02	0.07
Social media and digital marketing	1,500	10%	100%	0.05	0.01	0.04
Total				2.35	0.59	1.76

The Rural Socio-economic Survey also targeted livestock (cattle) farmers, but as they had no intention of borrowing from financial institutions, their financial needs were not calculated.

The combined financial needs of crop farmers, poultry farmers and aquaculture farmers are N 4,991 billion. As the purpose of the investment surveyed was to increase production and improve quality, so it can be considered as a whole the demand is a need for additional funds.

Next, we compile farmers' financial needs by purpose. Of this amount, it is assumed that the funds for increasing the amount of agricultural inputs can be met by recycling the existing agricultural loans, and the remaining capital requirement of N 2,349 billion will be allocated to TSL.

Table 3-108 Financial demands of farmers and portion for TSL

Financial demands of farmers	Borrowing demands (N billion)	Through cooperatives	By individuals
Fixed asset investment	1,654	726	929
Short-term loan for quality	694	305	390
Demands to be supported	2,349	1,031	1,318
Other short-term borrowing	2,642		
Total demands	4,991		

2) Financing needs of MSMEs

There are more than 3 million micro enterprises classified as agriculture-related, of which 77,053 registered enterprises and 1,424 small enterprises in the agricultural field are included, making up 78,477 enterprises. The table below shows the percentage of respondents who have an investment intention, are planning to borrow, and have sufficient collateral assets for each investment target as intentions in the rural socio-economic survey (a) Calculate the average investment amount for the target (b), and then calculate (a) the total planned borrowing amount of the relevant person ÷ the total planned investment amount (c), and calculate (a) × (b) × (c) for each investment target.) × number of companies in the country (78,477) = amount of borrowed funds required. The total borrowed capital requirement for each investment (excluding land) is N90 billion.

Table 3-109 Potential financial demands of MSMEs

Investment target	Intention observed in socio-economic survey			Amount of demands for the number of companies nationwide (78,477 companies) (a)x(c)x(c)x number of companies nationwide (N billion)
	Intend to Invest, borrow and have sufficient collateral asset (a)	Average investment amount of investment target (average of the sample on the left) (b) (N)	Planned borrowing amount/planned investment amount of the sample on the left (c)	
Land	7%	78,642,857	9%	38
Construction	4%	4,250,000	46%	6
Machinery	4%	20,000,000	32%	20
More procurement	23%	7,556,522	46%	63
Increased wage	3%	866,667	29%	1
Total (excluding land)				90

Source: prepared by the survey team based on the results of the rural socio-economic survey and SMEDAN AND NATIONAL BUREAU OF STATISTICS COLLABORATIVE SURVEY: SELECTED FINDINGS (2013)

3) Anchor companies' funding needs

In the Rural Economic and Social Survey, capital needs were estimated based on the results of the surveyed investment needs of anchor companies and their breakdown by financing method, as well as the number of companies. The number of enterprises is 6,784 based on data from Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), which is 152 medium-sized enterprises in the agricultural sector, 29,496 small and medium-sized enterprises in wholesale trade and manufacturing, multiplied by the agricultural sector GDP ratio (23%). In overall, a total of 6,936 companies were targeted.

The total borrowed funds demands for each investment target is N33 billion.

Table 3-110 Financial demands of anchor companies

Investment target	Intention observed in socio-economic survey			Amount of demands for the number of companies nationwide (6,936 companies) (a)x(c)x(c)x number of companies nationwide (N billion)
	Intend to Invest, borrow and have sufficient collateral asset (a)	Average investment amount of investment target (average of the sample on the left) (b) (N)	Planned borrowing amount/planned investment amount of the sample on the left (c)	
Land	15%	25,500,000	8.8%	2
Construction	15%	190,000,000	8.6%	17
Machinery	38%	30,600,000	11.0%	9
More procurement	31%	26,250,000	11.0%	6

Increased wage	8%	15,000,000	8.3%	1
Total (excluding land)				33

Source: prepared by the survey team based on the results of the rural socio-economic survey and SMEDAN AND NATIONAL BUREAU OF STATISTICS COLLABORATIVE SURVEY: SELECTED FINDINGS (2013)

Start-ups play a role in organizing small-scale farmers and connecting them to commercial VCs. TSL Project estimates financial demands from startups. However, the business models of startups vary, such as supporting farmers to raise funds by themselves and re-lending to farmers, and providing credit in the form of in-kind rather than cash, etc. In other cases, the start-up itself purchases storage facilities and agricultural machinery and provides these services to farmers. In this way, while fulfilling the same support functions as other anchor companies (processing and distribution), they may also function as a cooperative that supports farmers' activities as a whole. Therefore, when calculating financial needs, start-up financial demands are included in farmers' financial demands.

4) Calculation of financial demands by borrower and by project

The results of the above calculations are summarized and displayed by borrower in the table below. Start-ups often support farmers through cooperatives, so the amount provided through cooperatives includes start-ups. The total loan amount for farmers, micro and small enterprises, cooperatives/start-ups and anchor enterprises is N 2,471 billion.

Table 3-111 Calculation of demands by borrower type

Demands by borrower	Amount (N billion)	Comments
Farmers (including large scale farmers)	1,318	Individual farmers
Micro and small enterprises	90	
Cooperatives, Start-ups	1,031	Start-ups mainly support through cooperatives
Anchor companies	33	Include suppliers and machinery service
Total	2,471	
(Reference) Total demands of farmers and companies	5,113	Total including N2,642 billion, demand for "Expand purchase of seed and input"

Source: Made by Survey Team

Of the N2,471 billion, N694 billion is short-term financing for farmers' quality improvement, which is short-term financing with a term of one year or less, and excluding this, N1,777 billion is financed with long-term financing with a term of more than one year. It is assumed that In this case, the N694 billion is a fund with a period of one year or less, so if the project implementation period is 5 years, it is expected to be rotated 5 times, therefore 1/5 of the financial demands will be prepared as primary

funds¹⁴⁸.

As a result, the total primary funding is N 1,916 billion (see table below). Furthermore, assuming that re-lending will be carried out using the repayment funds of the existing on-lending program loan, and that it will be re-lent at least once every five years, and subtracting the current balance (balance is N853 billion), the amount to be supported with a new program loan is N 1,063 billion, which is approximately JPY 202 billion when converted to Japanese yen.

Table 3-112 Calculation of demands by fund tenor

Demands by fund tenor	Amount (N billion)	Comments
Short-term funds	694	For high quality input
Of which 1st generation	139	Since the funds are expected to be one year or less, there will be five turnovers over the five years of the project implementation period, and 1/5 of the financing needs will be 1 st generation funds. .
Long-term funds	1,777	
Total of 1st generation	1,916	
Of which met by existing program loan	853	Balance of existing onlending program for agricultural sector
Shortfall	1,063	
Shortfall (JPY billion)	202	1Naira=JPY0.19

Source: Made by Survey Team

5) Financial demands by type of sub-loan

The table below shows how the total 1st generation funds of N 1,916 billion will be distributed by sub-loan type (agricultural production loan, fixed asset loan, working capital loan, re-lending loan) as described in the next section. Farmers' financial needs are rarely directly sub-borrowed by farmers, but rather cooperatives, start-ups (SU), and anchor companies act as sub-borrowers, and arranging and providing agricultural materials to farmers, and providing access to agricultural machinery services and post-harvest processing facilities. Therefore, farmers' demands for agricultural production and fixed asset investment will be divided to a certain type of sub-loans of other sub-borrowers using the assumptions shown in the table below.

Table 3-113 Dividing farmers demands to type of sub-loans

(N billion)

Demands	Farmers	Cooperatives/ SU	Micro and small companies	Anchor companies	Total	Divide farmers demands to type of sub-loans
High quality input	78	61	0	0	139	1/2 of demands is divided to re-lending
Fixed asset	929	726	26	26	1,707	3/4 of farmers demands is divided to cooperatives/

¹⁴⁸ In a revolving type TSL, for example, if the funding limit is 1 billion yen, the stage where all 1 billion yen is disbursed is the 1st generation, and the stage where the repaid funds are repeatedly disbursed is the 2nd generation¹. Of the financial demands, production input funds are assumed to be funds for approximately one year or less, there will be 5 rotations in 5 years, so if 1/5 of the demand would meet the demands.

						SU (1/4) , Anchor companies (1/4) , and relending (1/4)
Working capital			64	7	70	
Total	1,006	787	90	33	1,916	

Source: Made by Survey Team

Based on the assumptions in the table above, a portion of farmers' financial needs are divided to the financial needs of other sub-borrowers, and the results are displayed by sub-loan type and sub-borrower (see the table below). By sub-loan type, fixed asset loans have the largest amount. By sub-borrower, cooperatives and startups are expected to account for the largest portion.

Table 3-114 Financial demands by types of sub-loan

(N billion)

Type of sub-loan	Farmers	Cooperatives/ SU	Micro and small companies	Anchor companies	Total 1 st generation	Deduct turnover of existing onlending program
Agricultural production loan	39	61	0	0	100	55
Fixed asset loan	232	958	26	258	1,475	818
Working capital loan			64	7	70	39
Re-lending loan		271	0	0	271	150
Total 1 st generation	271	1,290	90	265	1,916	1,063
Deduct turnover of existing onlending program	150	716	50	147		1,063

Source: Made by Survey Team

This TSL project aims to improve the productivity and income of small-scale farmers, but it may be difficult for small-scale farmers who have not yet accumulated capital to directly become sub-borrowers, not only from the viewpoint of interest rates but also from the perspective of collateral. The activities of agricultural cooperatives are also sluggish. Therefore, it is necessary to promote financial access through the private sector, including anchors (companies and SUs). For this reason, it is important to take advantage of the flexibility of the private sector. Therefore, the breakdown of funding demand by sub-loan type calculated above is only for reference.

However, through consulting services, it is necessary to periodically (about once every six months) monitor KPIs, confirm that funds are being used for sub-projects that match the project purpose, and implement necessary promotional measures, if necessary.

(3) Scale of financial demands

The estimated funding demand from the supply side and macro policy is N1.806 billion. On the other hand, based on the results of the rural socio-economic survey, it is to understand trends in demand for funds by borrower and use of funds from the demand side perspective to find that there is a large

need for cooperatives and start-ups as borrowers, and for fixed asset investment as use of funds. The aggregated demand from demand side will be approximately N 1,916 billion (approximately N 1,063 billion if assuming the rollover of existing program loans), resulting that the scale of the calculation from the demand side is not significantly different from the result of the calculation about supply side.

In this Survey, the increase in farmers' gross profit (potential increase in agricultural producer income) is estimated to be N12.4 trillion, assuming that unit yields improved to the same level as neighboring countries (2021 data).

The ratio of outstanding agricultural loans (N 1,458 billion) to the agricultural sector nominal GDP (N 41,126 billion) in 2021 is 3.5%. Assuming that the ratio of agricultural loans to nominal GDP is constant at 3.5%, and assuming that the gross profit of farmers (agricultural producers) is approximately the same level as the nominal GDP of the agricultural sector, increase of the amount of agricultural loan required for increase of the gross profit of farmers by N12.4 trillion is $12,400 \times 3.5\% = \text{N}434$ billion.

If setting the target time point for achieving the potential increase in agricultural producer income as 2028 and assuming that the annual increase rate of the agricultural sector GDP deflator (annual increase rate of nominal prices) is 8%, the potential increase in agricultural producer income is N 21,251 billion ($=12,400 \times (1.08)^8$), and the increase in agricultural credit required for this increase is N744 billion ($=21,251 \times 3.5\%$). Assuming that the TSL project's funding is around 30 billion yen (N158 billion), it is expected to contribute to the equivalent of 21% ($=158 \div 744$) of the potential increase in agricultural producer income.

Table 3-115 Increase of agricultural finance needed to achieve the potential increase of farmers' income

(N billion)

	Potential increase of income of agricultural producers	Increase of agricultural finance needed to achieve the potential increase of income of agricultural producers
Assumption as of 2021	12,400	434
Assumption as of 2028	21,251	744

Source: Made by Survey Team

3.6.7 Sub-loan

(1) Basic principle

- Loan screening for sub-borrowers will be conducted according to each PFI's existing screening policy. PFI assumes the credit risk of sub-loans.
- Loans to anchors (cooperatives, large-scale farmers, companies, startups) require VC contracts, etc. targeting small and medium-sized farmers and producer cooperatives.
- If a producer group of small and medium-sized farmers is receiving financing, and they have already secured a sales channel and do not need support from an anchor organizer, submit a list of sales channels and sales destinations.
- If the sub-loan amount is equivalent to 1 billion yen or more, PFI needs to obtain consent from

JICA via CBN.

- The target area is the entire country of Nigeria.
- The target of the sub-loan is a natural person or a corporation based on Nigerian laws and regulations, and in the case of a corporation, the majority of the investment must be made by a Nigerian natural person or a corporation.

(2) Sub-borrower

Farmers, cooperatives, and companies specified in the table below who meet the following requirements.

- A financially sound person (entity) who is engaged in economic activities in agricultural VC.
- Persons (entity) who are sound in terms of business content and environmental and social considerations.
- Persons (entity) who comply with Nigerian laws and regulations and JICA's environmental and social consideration guidelines.

Table 3-116 Definition and requirements of sub-borrowers

Sub-borrower	Definition and requirements
Small and medium scale farmers	Crop farmers with farmland area of 10 ha or less. Poultry farms with not more than 2,000 chickens. Livestock farmers with not more than 50 cows, 100 goats and sheep, and aquaculture farmers with annual sales of not more than N2,000,000
Micro and small sized enterprises	Companies with 50 or fewer employees that are registered with CAC and engage in agricultural production, production and sales of agricultural materials, post-harvest processing, storage, and processing, and not fall under the categories of suppliers (anchor companies) below.
Large scale farmers	Farmers whose scale is larger than that of small and medium-sized farmers, and who carry out contract cultivation, etc. for small and medium-sized farmers based on written contracts.
Agricultural cooperatives	A registered agricultural cooperative with a size, track record, and financial structure that meets PFI's loan eligibility criteria.
Credit cooperatives	A registered credit cooperative with a size, track record, and financial structure that meets PFI's loan eligibility criteria.
Suppliers (anchor companies)	A company registered with CAC that is a medium-sized company or below, and manufactures and sells agricultural materials. It should provide technical guidance when selling to small and medium-sized farmers. Submission of a list of supported farmers is required.
Anchor companies	A company registered with the CAC that is a medium-sized company or smaller, and engages in the distribution, post-harvest processing, storage, processing, and sales of agricultural products, and procures agricultural products from small and medium-sized farmers and agricultural cooperatives. Then, assistance such as advance delivery of materials, provision of funds, guidance on farming methods, monitoring, collection and transportation, market access, etc. will be provided based on the written VC contract.
Start-ups	Companies registered with CAC or registered cooperatives that support small and medium-sized farmers by providing organizer (quasi-agricultural cooperative) functions (including via agricultural cooperatives). Assistance such as advance delivery of materials, provision of funds, guidance on farming methods, monitoring, collection and transportation, market access, etc. should be provided based on the written VC contract. This includes large companies; in the case of large companies, the PMO will evaluate their business plans in advance and certify them as eligible.
Agricultural machinery	A business that is a company registered with CAC or a registered cooperative that

Sub-borrower	Definition and requirements
platformers	aggregates information on agricultural machinery owners, matches information with agricultural machinery service users over a wide area (multiple states), and efficiently delivers agricultural machinery services.

Note: The definition of small and medium-sized farmers is based on the survey team's analysis of data from economic and social surveys of rural areas.

The definition of medium enterprises follows the SMEDAN classification: micro enterprises have fewer than 10 employees, small enterprises have 10 to 49 employees, and medium enterprises have 50 to 199 employees. Separately total assets (excluding land and buildings) size classification is also used, but if the results of judgment using both size classifications result in different company classifications, employee size classification remains.

(3) Sub-project

Sub-loans will be used to invest in agricultural VC's productive assets, i.e., agricultural production materials, working capital, post-harvest processing and storage, processing, and distribution, and in principle will be used to invest in the following:

Agricultural production:

- Crop production, poultry farming, livestock farming, and aquaculture

Agriculture and seafood processing:

- Flour milling, vegetable refrigeration and processing, feed, oil, fish drying and smoking, sugar production, dairy products, packaging, meat processing, cash crop processing, etc.

Agricultural machinery:

- Tillers, tractors, power sprayers, transporters, threshing machines, irrigation pumps/sprinklers, solar/mechanical dryers, warehouses/storage facilities, graders and sorters used primarily in agriculture and fishing, shellers, and transportation facilities, etc.

Agriculture and fisheries related facilities:

- Facilities of warehousing, slaughterhouses, freezing and ice plants, cold storage, agricultural and fisheries machinery factories, transport (including transport carriers, transport boats, etc.) and other service providers.

Distribution/Packaging:

- Buying and selling of agricultural and fishery products and their packaging

Agriculture and fisheries industry related infrastructure:

- Small-scale power generation and irrigation facilities, farm-to-market roads

Excluded uses of funds:

- General and administrative expenses, other indirect expenses
- Taxes, land and other real estate purchases, compensation for resident relocation, etc., targets on JICA's negative list

(4) Types of sub-loans and eligible borrowers

There are four types of sub-loans:

Agricultural production loan:

The funds will be used to purchase materials and services necessary for agricultural production. The financing period is short-term (within one year) or medium-term financing (within two years), and the period and repayment method will be set in accordance with the cash flow according to the cultivation and harvesting schedule. The interest rate shall be 9% per annum. In addition, agricultural insurance shall be taken out. Use NAIC-subsidized agricultural insurance whenever possible. The management cost of PFI shall be 2% or less.

In principle, the maximum amount per transaction is N 1,000 million.¹⁴⁹

WC (working capital) loan:

The company's increased working capital and seasonal funds will be used to procure crops, process them, trade in purchased and sold products, and operate facilities. The loan term is short-term or medium-term funds, and the period is set to correspond to the cash flow according to the payment and collection schedule. The interest rate shall be 9% per annum. For funds related to agricultural production, use agricultural insurance as much as possible. The management cost of PFI shall be 2% or less.

In principle, the maximum amount per case is N250 million¹⁵⁰.

Fixed asset loan:

The funds will be used to purchase agricultural machinery and agricultural-related facilities and equipment. The period is longer than medium-term funds (long-term funds), and there is no hindrance to the replacement cycle of the target assets of the project, and from the viewpoint of PFI, there is no problem from the perspective of collateral asset value based on the depreciation schedule of eligible collateral asset values of the PFIs. The interest rate shall be 9% per annum.

In principle, the upper limit amount is N 3,000 million¹⁵¹.

Re-lending loan:

Cooperatives and anchors re-lend to small and medium-sized farmers to help farmers' access agricultural production loans and fixed asset loans. This includes cases where the agricultural machinery platform borrows a sub-loan and re-lend or leases it to agricultural machinery investors. The loan period is based on the terms of agricultural production loans or fixed asset loans, or depending on the purpose of use of the funds by small and medium-sized farmers. The interest rate will be 9% per annum, and the re-lending interest rate to small and medium-sized farmers will be 11% or less per year¹⁵².

In principle, the upper limit amount is N 30,000 million¹⁵³.

¹⁴⁹ In the socio-economic surveyEconomic and Social Survey, we used the average amount of farmers' largest production costs (increased amount of chicks and materials) as a reference for 100 farmers.

¹⁵⁰ The maximum investment plan of farmers in the socio-economic surveyEconomic and Social Survey was used as a reference.

¹⁵¹ In the socio-economic surveyEconomic and Social Survey, the average amount of the largest fixed asset item (hatchery) of farmers was used as a reference for 100 farmers.

¹⁵² The management fee that banks apply when lending is approximately 2%, so we added 2% to 9% to make it 11%

¹⁵³ A re-lending project for a major start-up to farmers usually costs around N2 billion. .

By combining the above sub-borrower and sub-loan conditions, the applicable sub-loans for each sub-borrower are summarized in the table below.

Table 3-117 Available sub-loans by types of sub-borrowers

Sub-borrower	Agricultural production loan	WC loan	Fixed asset loan:	Re-lending loan
Small and medium scale farmers	Ok	-	Ok	-
Micro and small sized enterprises	Ok	Ok	Ok	
Large scale farmers	Ok	-	Ok	Ok
Agricultural cooperatives	Ok	Ok	Ok	Ok
Credit cooperatives	-	-	-	Ok
Suppliers (anchor companies)	-	Ok	Ok	
Anchor companies	Ok	Ok	Ok	Ok
Start-ups	Ok	Ok	Ok	Ok
Agricultural machinery platformers	-	Ok	Ok	Ok

(5) Other conditions

Collateral conditions will be determined by PFI based on its own lending policy.

In the case of a fixed asset loan, the sub-borrower shall contribute at least 20% of the sub-project amount (amount excluding non-eligible assets such as land acquisition) with its own funds. For agricultural production loans, WC loans, and re-lending loans, amount of sub-loans is up to 100% of the investment amount are possible, and PFI will decide whether to require a certain amount of own funds based on its own lending policy.

In other TSL projects implemented by JICA, there are cases where PFI is required to cover a certain percentage (20%, etc.) of the sub-loan amount with its own funds, but in the case of Nigeria, taking into account macro-level funding shortages, etc. , it is recommended that PFI will not be required to provide its own funds.

The sub-loan interest rate conditions will be reviewed at the JCC's decision if there is a major change in the economic situation.

6) Implementation of environmental and social management system

The TSL proposed in this survey includes components whose sub-projects cannot be identified before JICA financing, and because such sub-projects are expected to have an impact on the environment, FI is expected to be the category classification. In principle, projects that are expected to have a large-scale environmental and social impact equivalent to Category A will not be eligible for support.

At the time of this survey, the implementing agency and PFI for TSL have not been determined, but the sub-project review procedure from an environmental and social consideration perspective is envisioned as follows.

Once the TSL implementing agency has been decided, the implementing agency and JICA will jointly develop the ESMF (Environment and Social Management Framework) for this TSL. The ESMF shall comply with the Japan International Cooperation Agency Environmental and Social Consideration Guidelines (January 2022 Edition), as well as the Nigerian EIA Guidelines and NSBP (Nigeria Sustainable Banking Principles)¹⁵⁴. The ESMF also includes an Environmental and Social Management System (ESMS) checklist.

At the time of loan appraisal for sub-projects, PFI conducts screening using the ESMS checklist to confirm the impact on the environment and society. However, if a microfinance bank or agricultural cooperative could be a PFI, an examination of the environmental and social impact required in the case of small loans such as funds for purchasing agricultural materials by farmer groups and working capital for SMEs (funds for purchasing agricultural materials and funds purchased from farmers), the policy will be decided upon when formulating the ESMF, by discussing with the TSL implementing agency.

Regarding monitoring during sub-project implementation, the sub-project implementer (sub-loan borrower) regularly reports the results of environmental and social monitoring based on ESMS to PFI, and the TSL implementing agency compiles reports from PFI about the implementation status of ESMS, then regularly report it to JICA.

3.6.8 Schedule

The TSL project will start in the second quarter of 2025 and last for five years until the first quarter of 2030. JICA may implement Technical Assistance Grant for survey and capacity building which JICA needs to set up as a preparatory framework at commencement of the loan component.

Table 3-118 Schedule of TSL Project

	2024				2025				2026				2027				2028				2029				2030			
Loan Component																												
Technical Assistance Grant																												
Consulting Service																												

The Technical Assistance Grant is assumed to include the following contents.

- Establishment of operational guidelines
- Support establishing institutional base and capacity for the development of pre-approval products for agricultural production loans
- Trial and evaluation of SHEP ToT, creation of training manual for private partners
- Establishment of revolving fund audit policy
- Establishment of environmental and social checklist and ESMF
- Develop standard VC contract and VC contract training module
- Develop a tool for KPI monitoring

¹⁵⁴ This report 3.4.3 Current status of environmental and social management systems (ESMS) (1), NSBP (Nigeria Sustainable Banking Principles).

3.6.9 Coordination with other donor agencies

Collaboration with other donors was discussed in 2.5, but especially for TSL projects, collaboration with SAPZ I and IFAD-VCDP is considered.

Table 3-119 Coordination with projects of other donors under TSL project

Project	Coordination	Target states
SAPZ I	Collaboration by holding matching events between companies using processing centers, their business partners, and farmers with PFI.	Imo, Cross River, Oyo, Kaduna, Kano, Kwara, Ogun, FCT
IFAD-VCDP	Holding a matching event between VCDP anchor companies and PFI. Sharing research prices from CAF's Price Committee and utilizing them for contract farming contract prices.	Anambra, Benue, Ebonyi, Taraba, Niger, Ogun, Kogi, Nasarawa, Enugu

3.6.10 Cooperation with Japanese enterprises

TSL project will collaborate with Japanese companies to specifically contribute to the development of Nigeria's agricultural machinery ecosystem. As mentioned in 2.6, a team of Japanese companies (STANDAGE, Mitsubishi Corporation Nigeria, Zowasel, Honda Manufacturing (Nigeria)) is working together to promote the import and popularization of used agricultural machinery. On the other hand, many startups, including their own investments, are anticipating a large demand for agricultural machinery. For example, Hello Tractor expects demand for 2,000 small tractors over the next two years on its platform. Based on the results of interviews with farmers and producers and the economic and social surveys, there is a large potential demand for investment in agricultural machinery on the producer side too, and it is assumed that this is a promising project for TSL. The TSL project will collaborate with Japanese corporate teams when responding to the financial needs of agricultural machinery demand.

The AFICAT project is supporting the expansion of Japanese agricultural machinery manufacturers into the country, and as the agricultural machinery market expands, it is thought that the awareness re of Japanese brand will be enhanced. Particularly in terms of finance, the development of the used market will lead to higher evaluation prices when banks evaluate the machineries as collateral, and will contribute to expanding access to Japanese agricultural machinery which is of superior quality.

3.6.11 (Reference) Experience of Japan in development finance

(1) Intervention measures

In general, difficulties of finance to private sector can be broken down to (i) Lack of funds (long-term funds in particular) in terms of macro economy, (ii) High market interest rate (high risk-free interest rate), (iii) large interest margin required by financial institutions, and (iv) insufficient collateral of borrowers. Those difficulties might be caused by market failure or inexistence of market, defects of institutional development, etc.

In order to overcome or mitigate the negative influence due to those difficulties, government sector intervenes to private sector through various policy measures. Policy measures to facilitate concessional conditions for finance aiming at development impact comprise of (i) policy bank's direct lending (direct

lending by government owned policy bank), (ii) back finance (government finance each sub-loan by concessional fund), (iii) credit guarantee (government financially supports local/private credit guarantee fund), and (iv) subsidy to interest (government compensate for interest payment by borrowers by subsidy).

As unofficial measures, there is also a policy guidance (government authority suggest/require the distributing financial institutions to offer concessional conditions as a moral suasion).

Table 3-120 Financial difficulties and the intervention measures

Intervention measures	Difficulties (market failure or lack of market)			
	Lack of funds, long-term funds in particular (Macro-economic background)	High market, risk-free interest rate (Macro-economic background)	Large interest margin (due to information opaqueness)	Insufficient collateral (institutional underdevelopment, lack of liquidation market, etc.)
Policy bank's direct lending	Applicable	Applicable	Applicable	Applicable
Back finance (Onlending, or Refinance)	Applicable	Applicable		
Credit guarantee			Applicable	Applicable
Subsidy to interest			Applicable	

Source: JICA Survey Team

Those intervention measures aim to bring developing impacts through private financial institutions except policy bank's direct lending. For example, back finance (onlending scheme) enables private financial institutions to provide more patient funds with lower interest that would not be possible without the intervention. On the other hand, credit guarantee aims to lower the required margin and mitigate collateral requirements by the intervention of risk sharing.

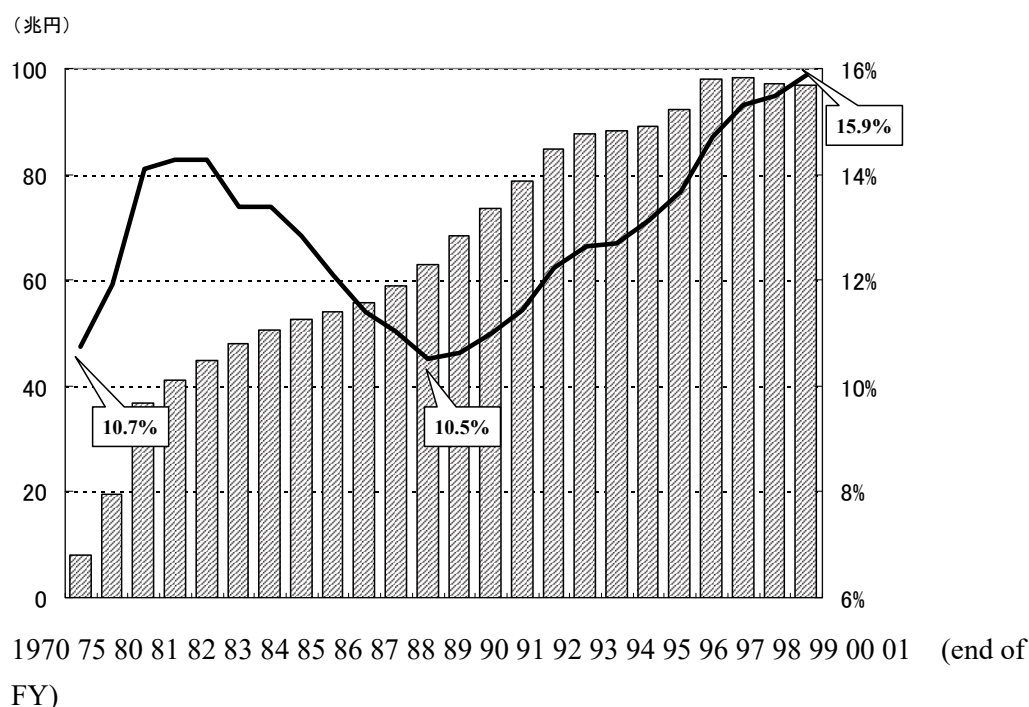
Direct lending by policy banks address all the difficulties, while its disadvantage is it avoids market mechanism. Therefore, the direct lending may cause overdosing, and it is more likely vulnerable to political intervention than the other means without appropriate monitoring and brake.

(2) Historical experience of Japan

Japan has a public finance system called "Fiscal Investment and Loan Program" (FILP). This is funded by postal savings. Postal savings used to be exceptionally competitive in the whole individual saving and deposit market. Postal savings accounted for more than 30% of the total market in 1980s. Japan Post Bank was not allowed to operate loan business in that time, instead all the mobilized funds were invested through FILP. Major part of means of investment by FILP is investment Japanese Government Bonds and lending through government policy banks including agricultural bank, SME bank, Micro business bank, etc.

The funds should be invested every year, which somehow forced the policy banks to disburse along the yearly budget. Policy makers supported the policy banks because the disbursement is perceived as

their accomplishment which appeals to their stake holders. The share of those policy banks in the loan market reached to 15.9% in 2001, and the ballooned market share highlighted the negative effects such as cost-benefit balance and distortion to the market.

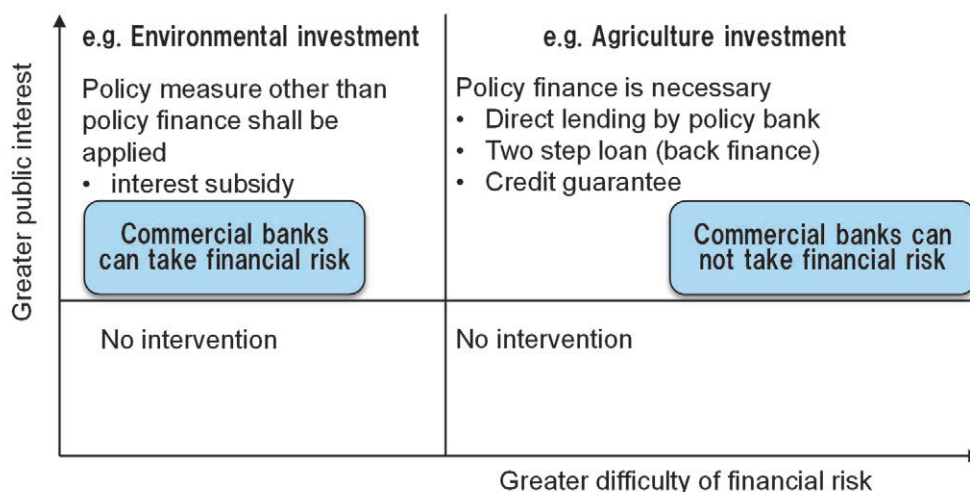


Source: “Government Banking Activity in US UK Germany and France”, Economic and Social Research Institute, Japan

Note: The share of policy banks declined in 1980s because so called “bubble economy” boosted the private finance.

Figure 3-26 Loans of policy banks in Japan (amount in trillion JPY and % share in the whole loan market)

The Government decided to restructure the policy banks through a decade’s process starting in early 2000s including consensus development among the public including opposing lobbying groups. In the discussion, basic concept was agreed on criteria to justify government intervention where both “greater public interest” and “greater difficulty of assessing financial risk” are met. Agriculture is a typical subject to meet those criteria. According to those criteria, it was also agreed to replace the direct lending of the policy banks by other means such as back finance and credit guarantee.

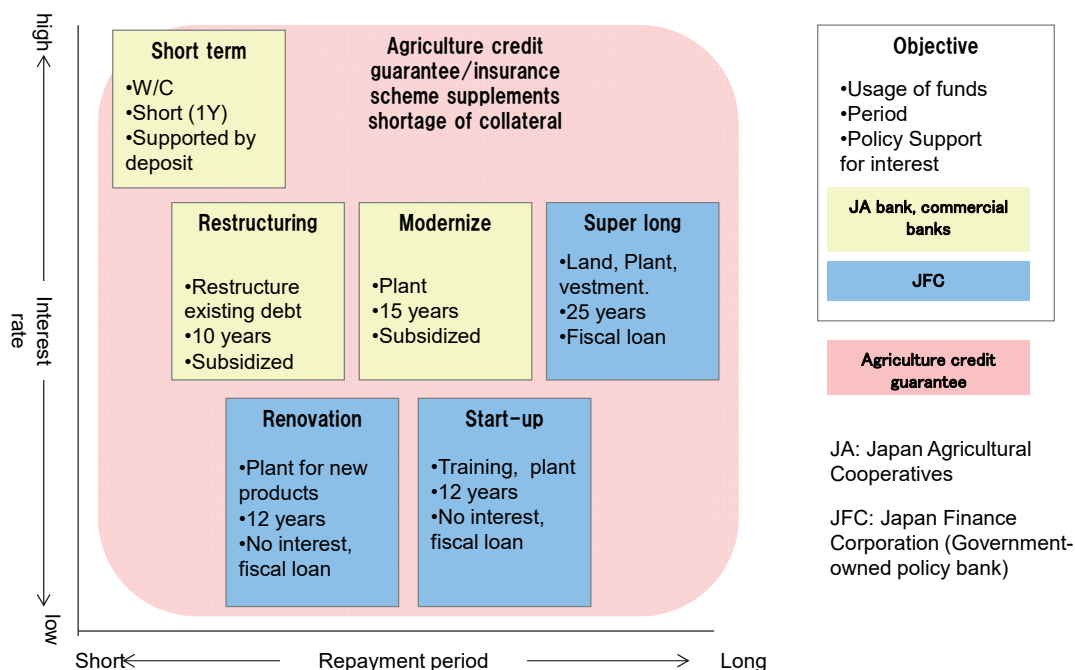


Source: Based on minutes of discussion in Council on Economic and Fiscal Policy of Japanese government

Figure 3-27 Criteria to intervene the market by policy finance in Japan

(3) Development finance for agriculture in Japan

As a result, the agriculture bank was merged to Japan Finance Corporation (JFC) together with the other policy banks. JFC is required not to overlap with private financial institutions. For agricultural loans, JFC concentrates on projects which take longer years and need low (zero) interest rate, such as land development, renovation and start-up farmers, etc. Cooperative banks (JA Bank) and other private banks are supposed to cover the other projects supported by the other intervention measures such as back finance and Agricultural Credit Guarantee.



Source: JICA Survey Team, Based on information of Ministry of Agriculture, Forest y and Fisheries

Figure 3-28 Demarcation between JFC and private banks including JA Bank (cooperative)

Table 3-121 Summary of concessional loan program for agriculture in Japan

Profile of program		Concessional loan program					
		Modernize	Super S	Super L	Renovation	Start-up	Restructure
Objective	Value chain			X	X		
	Start-up					X	
	New technology	X			X		
	Expand business		X	X			
	Risk management						X
Concession	Interest	X	X	X	X	X	X
	Repayment	X		X	X	X	X
	Collateral	X		X	X	X	X
	Credit guarantee	X	X	X	X	X	X
Policy measure	Policy bank lending			X	X	X	
	Subsidy to interest	X					X
	Back finance		X				
	Credit guarantee	X	X	X	X	X	X
	Guidance						

Source: JICA Survey Team, Based on information of Ministry of Agriculture, Forest y and Fisheries

(4) Implications for Nigeria's development finance, agricultural finance in particular

The current structure of agricultural loan schemes of Japan might be one of the reference as a future goal picture of agricultural development finance in Nigeria.

In the meantime, the current status of Nigeria is different from the historic observation of Japan. DFIs (policy banks) account for a small portion in the whole loan markets in Nigeria, similar to many other countries which do not have a special large funds such as FILP of Japan. Instead, commercial banks account for a majority in agricultural loan markets. Besides, considering the fiscal position of the central government as well, it may not be feasible to quickly expand the policy banks or DFIs.

Having viewed the current status of Nigeria, it might be recommended to sophisticate the intervention measures such as back finance (onlending scheme) and credit guarantee to avoid inefficient (misuse for out-of-target projects) fund allocations and political intervention, while trying to develop consensus of optimal demarcation among DFIs, cooperative banks and commercial banks, and establish a principle to apply the intervention measures such as policy banks (DFIs), back finance, credit guarantee and subsidy.

4 Present Condition and Supporting Measures for Agricultural Infrastructure

4.1 Policies Related to Agricultural Infrastructure

4.1.1 Policies Related to Agricultural Infrastructure

(1) National Development Plan (NDP) 2021-2025

This national development plan was written against the backdrop of several development issues and the need to address them within the medium- to long-term planning. It consists of seven areas: economic growth and development, infrastructure, public administration, human capital development, social development, regional development, and implementation/communication/financing/ and monitoring and evaluation. Agriculture, food security and value chains are included in the economic growth and development sector and irrigation is included in the social development sector.

1) Purpose

Unleashing the potential in all sectors of the economy for sustainable and holistic national development.

2) Goal

Aiming to improve economic competitiveness, poverty reduction, create jobs, and strengthen administrative governance capacity

3) Main issues

To achieve the goal, four strategic goals and six sector-specific development issues as shown in the table below were set, and KPIs for each development issue were also set.

Table 4-1 Structure of NDP

Strategic goals	Sector	Development issues
1. Steady growth of SMEs and promotion of industrial diversification by building a resilient business environment 2. Promoting investment in social infrastructure 3. Building a solid mechanism to strengthen security and improve governance 4. Increase vibrant, healthy and educated citizen	Economic growth and development	Macro economy/agriculture/food security/rural development/ manufacture, industry/oil, gas, steel industry/business, investment environment/culture, creative, tourism
	Infrastructure	Transport/electricity, alternative energy/housing, urban development/digital economy/science, technology/finance
	Public administration	National defense, peace and safety/governance/foreign policy, international economy
	Human development	Education/health/food, nutrition
	Social development	Water, sanitation/environment, disaster prevention/ gender equality/population, identity/poverty reduction, social

		protection/humanitarian aid/youth, sports/job creation/people with special needs
	Regional development	Collaboration with local governments

4) Development issues related to this study

1. Agriculture and food security (Chapter 4)

With the aim of improving agricultural productivity and reducing post-harvest loss, the KPIs are to reduce the ratio of food imports to all imported products from 20% to 15%, and to reduce the ratio of post-harvest losses from 60% to 30%. It also calls for strengthening value chain linkages.

2. Integrated rural development (Chapter 5)

Prioritizing the development of important rural infrastructure such as roads, off-grid electricity, and ICT equipment, the KPI is to extend rural roads by 20%.

3. Water resources and sanitation (Chapter 23)

Although the water resources sector is diverse, expansion of irrigated area is a major item directly related to the agricultural sector, and the goal is to implement 100% of the irrigation development plan area as a KPI.

【Agriculture, food security and value chain】

Although the agricultural sector is the most important sector in terms of GDP and employment, the NDP states that its growth rate has slowed recently, and this is due to challenges in agricultural inputs, technology, value chain linkages, etc. The country also has a high potential to contribute to economic growth due to its diverse natural environment suitable for agriculture and its young population. The goal for 2025 is to increase agricultural productivity and contribute to economic growth and food security.

Low agricultural productivity is due to the fact that quality agricultural inputs are not properly reaching farmers and infrastructure is lacking, resulting in high waste rates, higher food prices, and poor nutritional status. On the other hand, one of the strengths of Nigeria's agricultural sector is its ability to easily adapt to changes in the economy and production environment, and through increasing the linkage between agricultural companies and agricultural production, opportunities are being seen to expand the export market.

Based on this recognition, the KPIs for achieving the goals are: (1) Reduction of post-harvest loss ratio, (2) Expansion of cultivated land area, (3) Increase in agricultural export ratio, (4) Increase in women's agricultural participation rate, (5) Food security ranking improvement, (6) Raise the agricultural-related credit ratio (to total credit to the private sector); and (7) Lower the food-related import ratio.

【Irrigation】

Nigeria plans to significantly improve the capacity of its water supply and sanitation services by introducing commercially sound and environmentally sustainable water management practices by 2025.

The irrigation sector is included in the water resources and sanitation section of social development, and the irrigated area is set to increase from the current 24.35% to 100% in 2025 in order to increase agricultural production and improve food security. It also describes the National Irrigation Development Plan (2016-2030).

Based on the above national development plan, the National Agricultural Technology and Innovation Policy (NATIP) 2022-2027 has been formulated for the agricultural sector, and the irrigation sector has been aligned with the National Irrigation Development Plan.

【Local road】

Rural development covers a wide range of sectors, and the aim is to accelerate comprehensive rural development through infrastructure development and intersectoral collaboration. The government is taking a holistic approach to promoting rural development, focusing on programs and policies that create opportunities for residents.

The aim is to develop important rural infrastructure such as roads, off-grid electricity, and ICT equipment, and to promote the development of light industry and other industries. KPIs include improving the drinking water supply rate and increasing the electrification rate, as well as extending local roads by 20%.

【Market】

Although there is no specific mention of markets as infrastructure, in the chapter on agriculture, it is desired to strengthen market linkages in addition to storage and distribution to reduce post-harvest losses. In the chapter on rural development, improving access to local markets is important for promoting agriculture, which is the main industry in rural areas.

【Storage】

The chapter on agriculture aims to revitalize some national storage facilities and national food reserve mechanisms to ensure efficiency, effectiveness and transparency. In addition, support for those involved in the value chain, including storage, is also required to reduce post-harvest losses.

【Processing】

The chapter on agriculture calls for strengthening value chain linkages by utilizing local resources and adding value. To this end, it will create jobs by connecting local processors and buyers, focus on local processing and value creation, and secure nutritious food year-round.

(2) National Agricultural Technology and Innovation Policy (NATIP, 2022-2027)

The Federal Ministry of Agriculture and Rural Development (FMARD) has formulated NATIP to further promote industry by improving productivity, production volume, and quality in the agricultural sector by improving agricultural infrastructure and financial access. The following 10 intervention pillars and cross-cutting interventions have been established.

Table 4-2 Structure of interventions of NATIP

Item	Contents
Intervention pillars	1. Synergy and MDA Alignment 2. Knowledge Creation and Transfer 3. Rapid Mechanization 4. Establishment of Agricultural Development Fund 5. Revitalization of Extension Service Delivery 6. Livestock Development 7. Strengthening of Value Chains for Priority Crops 8. Fisheries and Development of Marine Resources 9. Market Development 10. Securing Agricultural Land and Investment
Cross-cutting interventions	1. Development of Rural Infrastructure 2. Nutrition 3. Standardization for Exports 4. Promoting Digital and Climate-Smart agriculture 5. Strengthening Agricultural Lending and Insurance 6. Data and Information Management 7. Access to Quality Agricultural Inputs 8. Sustainable use of Agricultural Land and Water Resource 9. Women and Youths in Agri 10. National Food Reserve and Food Security 11. Cooperatives Revitalization

From the perspective of agricultural infrastructure, intervention pillar 7. and 9. are infrastructure improvements to strengthen the value chain, and cross-cutting intervention 1. is the development of local roads, 8. is irrigation development, and 11. is the enhancement of public food reserves.

(3) Immediate and Long Term Strategies for The Water Sector (2016-2030)

The document says Nigeria is not poor but abundant for water resources. Irrigation is under the jurisdiction of the Federal Ministry of Water Resources and Sanitation (FMWRS, until 2022 the name was FMWR, Federal Ministry of Water Resources), and the irrigable area is 3.1 million ha. The total irrigated area is 440,000 ha, the developed area is 130,000 ha, and the actual irrigated area is 70,000 ha.

The National Irrigation Development Program (2016-2030) is divided into three phases, with 100,000 ha in the first phase (2016-2020), 170,000 ha in the second phase (2021-2025), 225,000 ha in the third phase (2026-2030), a total of 500,000 ha by 2030.

4.1.2 Japan's Development Policy to Nigeria

(1) General

The basic policy of Japan's ODA in Nigeria Country Development Cooperation Policy of Japan states that Japan will work with the Nigerian government to promote high-quality, comprehensive economic and social development and social stability.

Priority areas include (1) Economic diversification and industrial promotion (particularly strengthening agriculture, fisheries, food industries, and the private sector) as a foundation for high-

quality economic growth.

(2) Rolling Plan

In the development issue “1-3 Economic diversification and industrial promotion”, the agriculture, fisheries, and food industry promotion program states, “with regard to agricultural development, supports that focuses on the entire value chain that connects agricultural products from production to processing and distribution, are provided for rice, that relies on imports for 1/3 of its consumption, although that is produced most in Sub-Saharan Africa, and other products which Japan’s technologies are utilized”.

(3) JICA’s Policy (Nigeria Country Analysis Paper)

In order to promote above (1) Economic diversification and industrial promotion, agricultural development, and business environment improvement and innovation promotion are priority programs. The agricultural development program aims “by providing supports for the entire value chain of agricultural and livestock products, like rice, of which production is No. 1 in Sub-Saharan Africa, but only 50% of domestic consumption is produced and there is a high dependence on imports, as well as other products which Japanese technology can be utilized, the productivity and profitability of the agricultural and livestock industry will be improved, thereby increasing farmers' incomes and revitalizing the rural economy, thereby contributing poverty reduction in rural areas and to strengthening food security by increasing food self-sufficiency”.

4.1.3 Analysis and Direction for Consideration

Since improving food security and the value chain are listed as major issues for the agricultural sector in the NDP, this survey will be conducted through organizing and analyzing the current status and issues of agricultural infrastructures, and then considering priority project proposals and a loan project from the perspective of improving food security through improving agricultural productivity and the value chain.

4.2 Current Status and Challenges of Agricultural Infrastructure Contributing to Food Security

4.2.1 Analysis of Current Situation of Food Security

(1) Food Shortage and Poverty Situation

According to data released by the World Food Program (WFP) in November 2022 for Nigeria's 26 states and the Federal Capital Territory (FCT), food security is in a dire situation, and it has been shown that the proportion of people who have minimal access to food is 34% of the population (Level 2¹⁵⁵ or above).

Furthermore, according to FAOSTAT, the number of people with severe or moderate food shortages is also increasing.

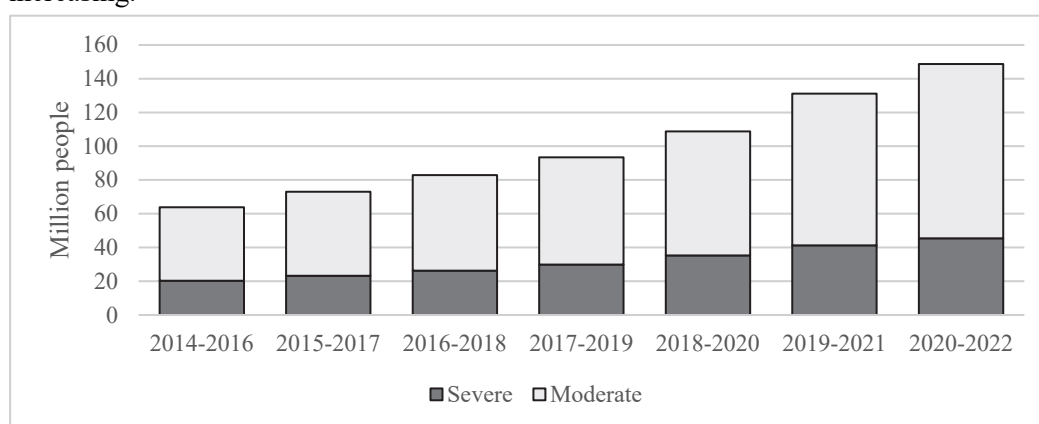


Figure 4-1 Trends in Food Shortage Population

Note: Severe indicates that there are adults in the household who are exposed to severe food insecurity throughout the year, such as not having eaten for an entire day. Moderate indicates that there are adults in the household who are exposed to moderate levels of food insecurity throughout the year, such as having to eat less.

Source: FAOSTAT

On the other hand, the number of people living in poverty and the poverty rate (cf. Note) are also increasing, with the former reaching 135.5 million in 2018, and the latter reaching 65.5%.

¹⁵⁵ The stages of food insecurity are ranked from level 1 (none/minimal) to level 2 (stress), level 3 (crisis), level 4 (emergency), and level 5 (catastrophic). Food Insecurity In Nigeria: Food Supply Matters, IMF eLibrary, March 2023

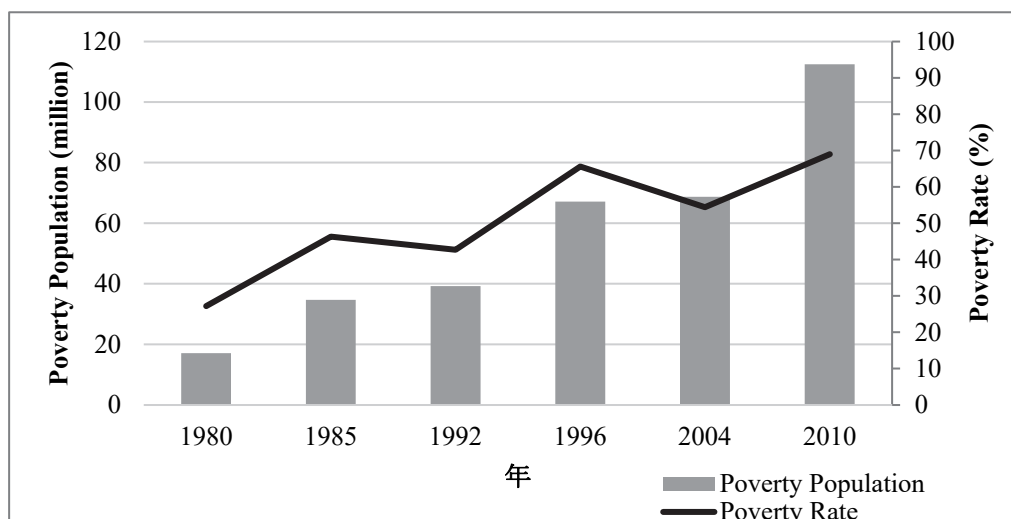


Figure 4-2 Population and Rate of Poverty

Source: Study Team made from Nigeria Poverty Profile 2010 NBS

Note: The definition of poverty is Relative Poverty, which indicates the proportion and number of people whose household expenditure is less than two-thirds of the average household expenditure.

Given the above, there is an urgent need to improve food shortages and poverty.

(2) Rate of Small-scale Farmers

The table below shows the percentage of farms by size in Nigeria. The percentage of small-scale farms of 2 hectares or less is high at 80%, and the majority of farmers are small-scale. The irrigation rate of farmland of these small-scale farmers is low and the country relies on rain-fed agriculture.

Table 4-3 Farm size and ratio of holdings and irrigation rate

Category	Size (ha)	Average size (ha)	Total holdings (%)	Area (%)	Irrigated area (%)
Marginal farms	< 1	0.23	56	23	0.3
Small farms	1 - 2	1.42	24	36	2.2
Semi-medium	2 - 4	2.69	11	21	21.8
Medium	4 - 10	4.87	6	11	33.7
Large	> 10	13.51	3	9	42.2
All farms		2.25	100	100	100.0

Source: Tenacity of small farms and poverty levels: Evidence of relationship among farming households in Nigeria (2019, Apata)

Nigeria has the world's largest population of poor people, and the poverty rate is extremely high in rural areas where farmers are concentrated. In addition, it is said that approximately 90% of agricultural production is carried out by small-scale farmers, who make up the majority of rural residents (approximately 100 million people), and improving the productivity of small-scale farmers can lead to countermeasures for hunger and poverty.

(3) Balance of Demand and Supply of Major Crops

Although Nigeria's production of major crops is increasing, domestic demand exceeds domestic supply due to population growth. Although the population growth rate has been on the decline in recent years, it is still hovering around 2.4%.

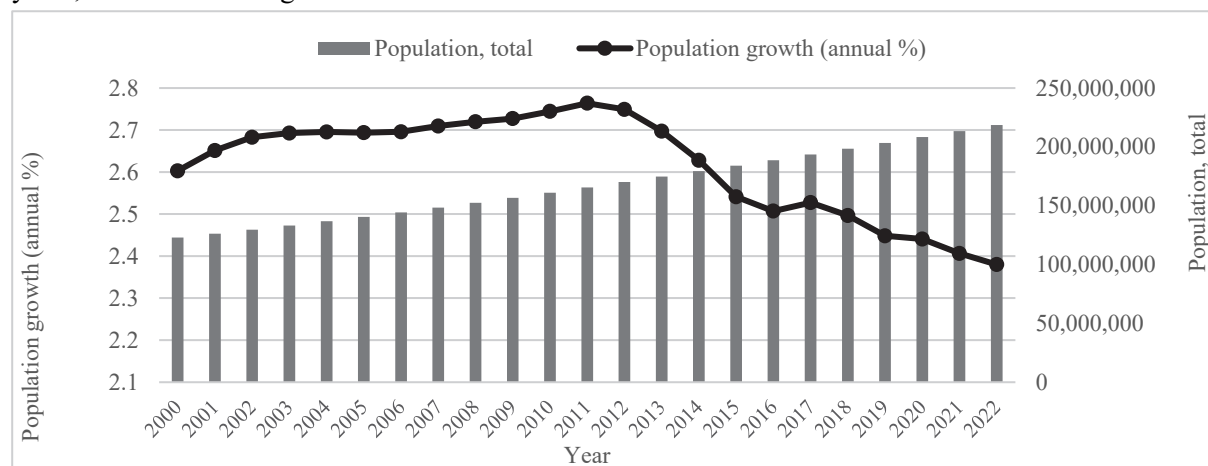


Figure 4-3 Trends in Nigeria's population and growth rate

Source: World Development Indicators, WB

Among the major crops (cassava, yam, maize, rice, sorghum: accounting for 78% of the total cultivated land area (36,872,000 ha)), the domestic supply of rice, maize, and yam has increased in recent years, but domestic demand is increasing even more.

Furthermore, the import value of rice, maize, and sorghum exceeds the export value. For this reason, it is necessary to increase domestic supply.

Table 4-4 Production volume and supply and demand of major crops

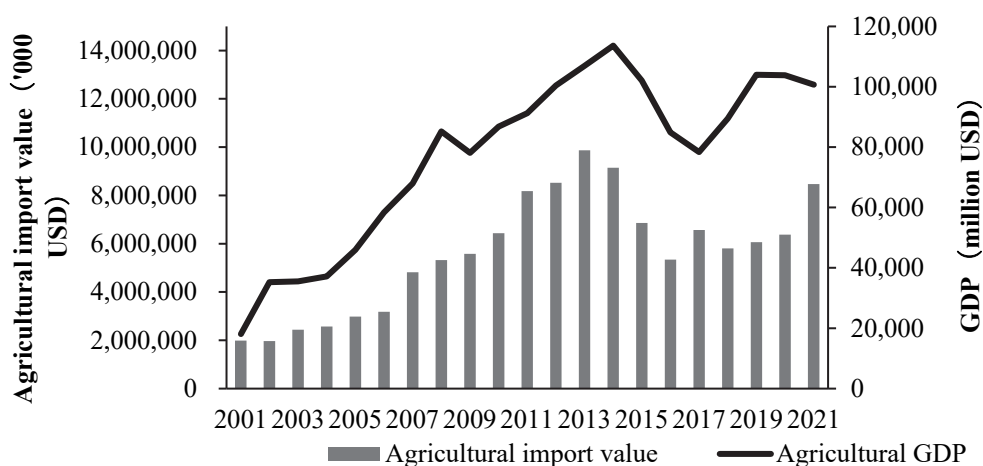
Crop	Production (K tons)	Harvested Area (K ha)	Annual rate of increase in domestic demand for 5 years	Annual rate of increase in domestic supply for 5 years	Export amount 2020-2021 ave. (USD million)	Import amount 2020-2021 ave. (USD million)
Rice	8,342	4,195	3.8%	2.1%	1.3	21.0
Maize	12,745	5,500	3.0%	2.1%	1.1	68.2
Sorghum	6,725	5,600	-1.8%	-2.1%	0.3	7.3
Yam	50,377	6,200	3.3%	1.2%	0.0	0.0
Cassava	63,031	7,290	0.8%	-0.4%	0.7	0.3
Total	141,220	28,785	-	-	-	-

Source: APS, FAOSTAT, interview

(4) Trends of agricultural products import

Although Nigeria's imports of agricultural products had been decreasing for a while, they have been increasing in recent years. Looking at the growth rate over the past five years, the GDP of agricultural

products has increased at an annual rate of 3.7%, while the import value of agricultural products has increased significantly at an annual rate of 11.7%. Production increase is needed from the viewpoint of food security.



Source: FAOSTAT

Figure 4-4 Trends in agricultural GDP and agricultural import value

In terms of trade, looking at the imports and exports of surveyed items and their processed products, in 2021, exports were approximately \$1 billion and imports were approximately \$5 billion. The majority of exports are crops for processing, with cocoa-related products accounting for 66% and sesame seeds accounting for 31%. On the other hand, wheat-related products account for 97% of the grains that have a large import value.

The most imported grains are wheat, rice, soybeans, and maize, and the most imported vegetables are tomatoes. Of these, wheat is hardly grown domestically and accounts for more than 50% of the import value, while the import value of maize, rice, soybeans, and tomatoes totals \$121 million.

(5) Status of agricultural productivity

Yields for many of Nigeria's major crops are lower than those in neighboring countries, with rice yields at 77%, yam at 78%, and cassava at 61%.

Table 4-5 Comparison of yields of major crops with neighbouring countries (ton/ha)

Product	Benin	Burkina Faso	Cote d'Ivoire	Ghana	Guinea	Liberia	Nigeria	Senegal	Togo	Average excl. Nigeria	Nigeria / Average
Rice	4.1	2.1	2.9	3.0	1.5	1.1	1.9	3.7	1.6	2.5	0.77
Maize	1.2	1.7	2.2	2.7	1.5	NA	2.1	2.6	1.2	1.9	1.13
Sorghum	1.0	1.0	0.7	1.1	1.5	NA	1.2	1.3	0.9	1.1	1.10
Yam	12.8	7.5	5.5	18.5	8.5	8.7	8.5	17.0	8.7	10.9	0.78
Cassava	11.7	15.6	6.4	22.5	9.1	8.2	6.9	13.8	3.7	11.4	0.61
Millet	1.0	0.8	0.9	1.3	1.3	NA	1.0	1.1	0.6	1.0	0.96
Cocoyam	3.4	NA	1.2	6.5	4.6	9.2	3.9	NA	3.3	4.7	0.84
Plantain	NA	NA	3.8	11.2	5.2	2.2	6.3	NA	NA	5.6	1.12
Potatoes	11.8	5.5	NA	NA	12.4	NA	3.8	24.0	NA	13.4	0.28
Soybean	1.3	1.2	1.5	1.7	NA	0.4	0.9	NA	0.5	1.1	0.86
Cowpea	NA	0.5	NA	1.4	NA	NA	0.8	0.8	NA	0.9	0.86
Tomatoes	6.8	17.2	10.4	7.8	NA	13.6	4.2	16.4	4.3	10.9	0.39
Okra	3.7	7.4	2.8	21.4	NA	NA	1.3	36.0	NA	14.3	0.09
Sesame seed	0.8	0.6	0.2	NA	0.2	NA	0.9	0.9	0.3	0.5	1.73
Ginger	NA	NA	13.5	1.2	NA	NA	8.8	NA	NA	7.3	1.21
Groundnuts	1.1	0.6	1.7	1.0	1.2	0.8	1.1	1.4	0.7	1.0	1.04
Cocoa	NA	NA	0.5	0.6	0.5	0.2	0.3	NA	1.1	0.6	0.47
Cashew	0.4	1.1	0.4	0.5	1.7	NA	0.7	0.4	1.5	0.9	0.83

Source: FAOSTAT, 2021

In addition, the table below compares the unit yields of rain-fed agriculture and irrigated agriculture, and it is estimated that with the introduction of irrigation, the unit yield will increase by 42% for rice and 30% for maize.

This has the effect of further boosting Nigeria's low yield, and the development of irrigation has made it possible to cultivate in the dry season, and by changing from only rainy season cropping to double cropping that includes dry season cropping, it will increase not only production but also the income of small-scale farmers.

Table 4-6 Comparison of yield between rain-fed and irrigated agriculture (ton/ha)

Crop	Rainfed	Irrigated
Rice	2.51	3.58
Maize	2.97	3.87
Tomato	6.41	8.42
Pepper	4.25	5.76
Onions	6.10	6.6
Sugarcane	6.50	26.00
Wheat	-	2.80

Source: A review of the evaluation of irrigation practice, 2018 African Journal of Agricultural Research

Furthermore, according to “Immediate and Long Term Strategies for The Water Sector (2016-2030)”, the irrigable area is 3.1 million ha, and the developed irrigated area is 130,000 ha, only 4.2% of the irrigable area, indicating that there is ample potential for irrigation development.

(6) Adaptation measures to climate change

According to the results of a study on the effects of climate change, changes in temperature and precipitation will reduce annual runoff by 20% by 2050, with a greater impact on water demand during the rainy season than during the dry season. There are concerns about the impact on areas that rely on rain-fed agriculture. For this reason, it is important to develop irrigation systems that are less affected by changes in rainfall and to promote climate change adaptation measures.

Based on the GCM output results, scenarios related to temperature and precipitation changes were set. The scenario targets climate conditions in 2050. Based on the set scenario, the following risks are predicted.

- The anticipated changes in temperature could result in a reduction of around 20% in annual runoff.
- Irrigation water demand will be approximately 16% higher than the base climate condition. The impact on water demand during the rainy season is greater than during the dry season, and the impact on water demand for small-scale irrigation, which is assumed to be based on groundwater sources, is even greater. (For irrigation schemes that use surface water as a water source, the impact of the rainy season is +22%, and the impact of the dry season is +12%, for a total of +16%.)
- The safety level of urban water used as a surface water source decreases compared to the base climate state, and the possible irrigation area with a safety level of 1/5 also decreases. The reduction in irrigable area is most noticeable in HA-6 and HA-8, both of which are areas where municipal water and irrigation water use compete with each other.

(Source: The project for review and update of Nigeria national water resources master plan, JICA, January 2014)

(7) Farmland area status

Nigeria's land area is 924,000 km², about 2.5 times that of Japan, of which agricultural land accounts for a large proportion of 72%, and most of it has already been developed into arable land, perennial crop land, and grazing pasture land, and in recent years arable land has been remain unchanged.

Table 4-7 Nigeria's agricultural land area

Item	Area, '000 ha	Ratio, %
National Land	92,377	100.0
Agricultural Land	66,521	72.0
Cropland (excluding perm.crop)	35,000	37.9
Land under Permanent Crop	6,500	7.0
Medows and Pastures	25,021	27.1

Source: AQUASTAT, FAOSTAT, 2020

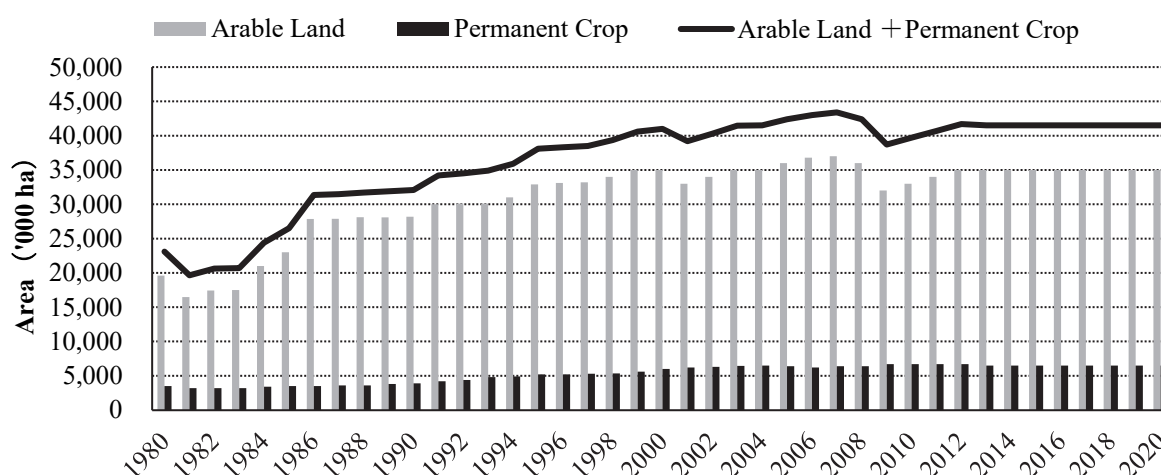


Figure 4-5 Changes in the area of cultivated land and permanent cropland (Unit: '000 ha)

Source: AQUASTAT

(8) Post-harvest loss situation

Post-harvest losses in Nigeria amount to 40% to 50%¹⁵⁶ of total agricultural production, which is higher than the average in Sub-Saharan Africa (20% to 40%)¹⁵⁷.

Food Smart Country Diagnostic (World Bank, 2020) identifies the stages in the value chain for specific crops where post-harvest losses occur. As shown in the table below, approximately 20% of losses occur during production, transportation, and storage for maize, and 63% for tomatoes. (cf. Note)

Table 4-8 Stages of post-harvest losses in maize and tomatoes

Crop	Food loss and waste hotspots along the value chain					Note
	Production	Transport/storage	Processing	Wholesale/Retail	Consumers	
Maize	6.4%	13.9%	3.5%	2.7%	1.0%	Net loss 25.0%
Tomato	25.0%	51.0%	25.0%	10.0%	5.0%	Total Loss 76%

Note: The loss rate shows the percentage of each stage, and the total loss is the multiplication value, not the sum of each loss rate. For example, the loss rate of maize at the stage of production and transport/storage is calculated; $1 - (1 - 6.4\%) \times (1 - 13.9\%) = 19.4\%$ (about 20%)

Additionally, data on these detailed stages are shown in Post Harvest Losses and Food Security in Nigeria: An Empirical Review (NISER (Nigerian Institute of Social and Economic Research), 2022), which was conducted by NISER in 2014. It was organized based on the results of the Post Harvest Food Loss Survey, 2013/2014.

¹⁵⁶ Food Smart Country Diagnostic (World Bank, 2020) and National Development Plan

¹⁵⁷ Post-harvest food losses in a maize-based farming system of semi-arid savannah area of Tanzania (Abass, A.B.; Ndunguru, G.; Mamiro, P.; Alenkhe, B.; Mlingi, N.; Bekunda, M, 2014)

Table 4-9 Amount and percentage of post-harvest losses by actor and crop

Crop	Average Quantity Harvested/Purchased (kg)			Average Quantity of Loss(Kg)			Average Loss (%)		
	Farmers	Processors	Marketers	Farmers	Processors	Marketers	Farmers	Processors	Marketers
Yam	3,827	3,321	13,218	1,175	694	1,150	24.8	0.2	6.4
Cassava	9,633	187,056	579,200	2,388	50,131	49,232	22.6	1.8	5.1
Maize	3,255	30,660	99,989	745	6,040	8,799	23.1	3.7	5.7
Rice	7,852	109,017	62,545	1,774	25,837	8,381	21.6	8.0	7.3
Cowpea	840	2,070	65,397	182	797	4,447	30.7	1.5	4.2
Average	5,081	66,425	164,070	1,245	2,019	9,680	24.5	3.1	5.7

Source: Post Harvest Food Loss Survey, NISER, 2013/2014

Table 4-10 Percentage of post-harvest losses in farm-level activities

Farm Activities	Proportion of Loss					
	Yam	Cassava	Maize	Rice	Cowpea	Average
Harvesting	11.4	7.9	5.7	6.9	5.9	7.6
On-Farm Storage	7.4	7.1	6.9	3.4	7.2	6.4
Transportation	6.0	3.5	1.8	1.6	2.7	3.1
Drying	-	4.1	3.1	3.1	4.5	3.0
Threshing	-	-	3.3	3.8	4.2	2.3
Winnowing	-	-	2.3	2.8	6.2	2.3
Total	24.8	22.6	23.1	21.6	30.7	24.5

Source: Post Harvest Food Loss Survey, NISER, 2013/2014

Table 4-9 and Table 4-10 above show the amount and percentage of losses for farmers, processors, and distributors. According to these, losses are greatest at the farm level, with an average loss of about 25%, with the highest being cowpea (30.7%) and the lowest being rice (21.6%). At the processing stage, rice processors had the highest percentage of losses (8.0%), and the same trend was observed at the sales stage (7.3% for rice).

Looking at the overall loss rate, 33.3% of the production volume was lost, and 74% of this loss was at the farm level. A certain amount of loss occurs at each stage of production, storage, transportation, drying, threshing, and shell sorting, so rather than trying to improve losses at each specific stage, it is considered important to try to improve losses at all stages handled by farmers.

Although losses are seen in processing and marketing, they are low compared to the overall amount of losses, so the priority of the initiative is low, and improvements are expected in the future through the introduction of private-sector technology and the application of new technologies.

On the other hand, this survey found that about 95% of farmers use traditional farming tools such as hoes, knives, swords, sickles, small rakes, and small shovels, and only 4.5% of farmers use agricultural machinery. Additionally, more than half of farmers (55%) store their crops in the open, leaving them vulnerable to crop losses.

Table 4-11 Percentage of losses in marketing activities

Activities	Proportion of Loss					
	Yam	Cassava	Maize	Rice	Cowpea	Average
Transportation	1.7	1.4	2.0	3.0	1.2	2.0
Packaging/Re-packaging	1.4	1.5	1.5	1.4	1.6	1.5
Storage/warehousing	3.3	2.2	2.2	2.9	1.4	2.4
Total	6.4	5.1	5.7	7.3	4.2	5.7

Source: Post Harvest Food Loss Survey, NISER, 2013/2014

The table above shows the percentage of losses for each crop due to marketing stage activities. Although it is thought that the loss rate is low in marketing because relatively large quantities of agricultural products are handled, the loss rate is relatively high in transportation and storage, so improvements in these areas are considered necessary.

(9) Analysis result

In view of the above, increasing the domestic agricultural production has become an urgent issue in Nigeria due to the increasing value of agricultural imports and the domestic demand for major grains exceeding supply. Furthermore, as the number of people with food shortages is increasing, the poverty rate and population are increasing, and many small-scale farmers are living in poverty, it is important to improve agricultural productivity in line with the increase in agricultural production.

In response to this situation, methods to increase agricultural productivity and production volume include (1) increasing productivity through single and double cropping through irrigation, (2) increasing production volume by expanding the cultivated area, and (3) reducing post-harvest losses to increase marketing volume. However, regarding (2), expanding the area of cultivated land, most of the land in Nigeria has already been developed, and there has been no expansion in the area of cultivated land in recent years, so it is difficult to expand the area of cultivated land on a large scale.

Based on the above, expanding the irrigated area and improving post-harvest loss are considered as measures to improve productivity.

4.2.2 Comparison of expansion of irrigated area and improvement of post-harvest loss

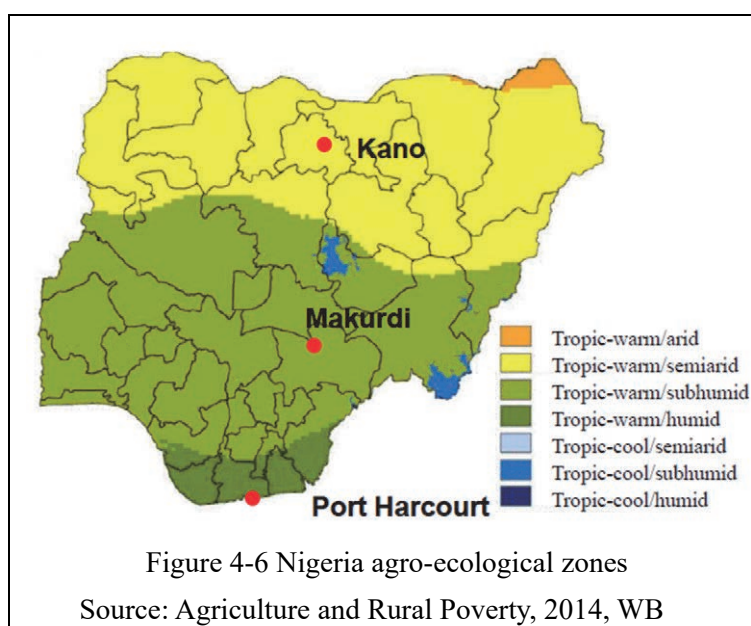
Comparing the improvement in productivity due to the introduction of irrigation agriculture and the improvement in post-harvest loss, sales value increases by 2.3 to 2.6 times with the introduction of irrigation, whereas improvement in post-harvest loss, at most, would increase by 1.3 times. Furthermore, an increase in sales amount will also increase the income of small-scale farmers, which is thought to contribute to poverty alleviation. For these reasons, it is considered beneficial to focus on the introduction of irrigated agriculture (improvement of irrigation facilities).

Table 4-12 Comparison of rain-fed agriculture and irrigated agriculture on small-scale farm (1 ha)
(Unit; yield:tons/ha, sales amount: 1000N)

Item		Rainy season (yield)		Dry season (yield)	Remaining amount (after deducting loss) (Rice 21.6%、Maize 23.1%)			Sales amount (with loss)	Note
Present situation	Rainfed 1	Rice 0.5ha	Maize 0.5ha	-	Rice 0.5ha	Maize 0.5ha	-	-	
		1.26	1.49	-	0.99	1.15	-	737.95	A
	Rainfed 2	Rice 1.0ha	-	-	Rice 1.0ha	-	-	-	
		2.51	-	-	1.97	-	-	969.24	B
Irrigation	Irrigation 1	Rice 0.5ha	Maize 0.5ha	Maize 1.0ha	Rice 0.5ha	Maize 0.5ha	Maize 1.0ha	-	
		1.79	1.94	3.87	1.40	1.49	2.98	1,903.15	2.6 times of A
	Irrigation 2	Rice 1.0ha	-	Maize 1.0ha	Rice 1.0ha	-	Maize 1.0ha	-	
		3.58	-	3.87	2.81	-	2.98	2,270.56	2.3 times of B
Loss improvement	Rainfed 1'	Rice 0.5ha	Maize 0.5ha	-	Rice 0.5ha	Maize 0.5ha	-	-	No loss
		1.26	1.49	-	1.26	1.49	-	942.68	1.3 times of A
	Rainfed 2'	Rice 1.0ha	-	-	Rice 1.0ha	-	-	-	No loss
		2.51	-	-	2.51	-	-	1,234.92	1.3 times of B
	Sales price	492	219	298					

Source: Study Team based on APS 2021 and Selected Food Price Watch, National Bureau of Statistics, Nigeria

Among the major agricultural products, cassava is able to continue growing even during droughts by dropping its leaves and suppressing transpiration, so its production volume is less affected. A high-yielding variety of yam was developed at the International Research Institute of Tropical Agriculture in 2001. The yield of native varieties of yam is 8 to 10 tons per ha, but the yield of these varieties



is 13 tons, and the growing period is 6 to 10 months¹⁵⁸.

As shown in the figure on the right, Nigeria's climate is broadly categorized into 3 categories; steppe climate (Tropic-warm/semiarid) in the northern region, savanna climate (Tropic-warm/subhumid) in the central region, and tropical monsoon climate (Tropic-warm/subhumid) in the southern region facing the Atlantic Ocean.

The figure below shows the rainfall in Kano, the capital of Kano State, Makurdi, the capital of Benue State, and Port Harcourt, the capital of Rivers State (each marked with a circle in the figure above).

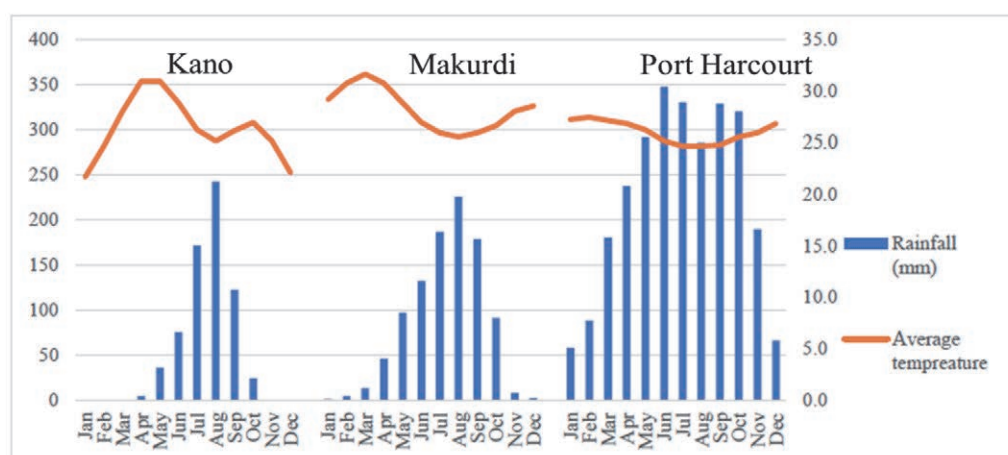


Figure 4-7 Precipitation of Kano, Makurdi and Port Harcourt

Source: JICA data collection survey on promotion of advanced agricultural technologies in Sub-Saharan Africa, Final Report, 2022, JICA

Particularly in areas other than the southern part of Nigeria, where there is little rain during the dry season, supplementary irrigation is required to obtain sufficient yields for cassava (11-12 months) and yam (6-10 months), which have long growing seasons. If a sufficient growing period can be secured through irrigation, the yield of cassava can be expected to double¹⁵⁹. On the other hand, with yams, we cannot necessarily expect an increase in yield, but by shifting the harvest season, we can expect sales prices to rise more than 10 times.¹⁶⁰

Based on the above, the improvement of Nigeria's food security will focus on improving irrigation facilities to increase productivity.

Regarding post-harvest losses, large losses occur at the farm level, rice losses are large at the processing stage, and it is necessary to improve marketing losses related to transportation and storage. As for agricultural infrastructure, efforts will be made to improve these post-harvest losses in conjunction with the development of irrigation facilities.

¹⁵⁸ Column, Importance of potatoes in African food, Africa Japan Forum

¹⁵⁹ https://www.jica.go.jp/Resource/project/all_asia/005/news/20201011.html, accessed on 28 January 2024

¹⁶⁰ Assessment of Supplemental Irrigation in Enhancing the Economic Viability of Yam Production in Nigeria, IJERT, 2013

4.3 Current Status and Challenges of Agricultural Infrastructure Contributing to Value Chain

Here, from a value chain (VC) perspective, the analysis is proceeded for agricultural infrastructure in the current status, issues and support measures, etc. and the prerequisites are confirmed beforehand. As seen in Chapter 2, Agriculture Distribution, the main flow of agricultural product distribution in Nigeria is that the products produced in the agriculturally prosperous northern region are transported to the populous southern region, and they are processed at medium- to large-scale food processing plants and sold in the consumer market. The table below summarizes the stakeholders involved, the agricultural infrastructure used, and the direct beneficiaries of infrastructure improvements, according to the stage of VC in production and consumption areas.

Table 4-13 Agricultural infrastructures in value chain

Area	VC segment	Stakeholder	Agricultural infrastructure used	Direct beneficiary by infrastructure improvement
Production	Production	Manority of small-scale farmers	Farmland, irrigation facility	Small-scale farmers
	Distribution	Small-scale farmers, SMEs	Rural road, production market	Small-scale farmers, SMEs
	Post-harvest	SMEs	Storage, processing facility	SMEs
Consumption	Distribution	Supply side wholesalers	Major roads	Supply side wholesalers
		Demand side wholesalers	Major roads, rural roads	Demand side wholesalers
	Processing	Medium to large enterprises	Storage, processing facility	Medium to large enterprises
	Marketing	Retailers	Consumption markets, storage	Retailers, consumers
	Consumption	Consumers	—	—
	Export	Exporters	Ports	Exporters

Source: Study Team based on 2.2.3 Agricultural Distribution

As seen in Chapter 2, each agricultural infrastructure has its own issues, but since this study aims to improve the agricultural productivity and profits of small-scale farmers, while keeping VC in mind as a whole, in this chapter, agricultural infrastructures in production areas are studied, because they have a large beneficial effect on small farmers. Specifically, they are; irrigation facilities as production infrastructure, local roads and production area markets as distribution infrastructure, and storage and processing facilities as post-harvest processing infrastructure. Regarding farmland, as mentioned above, approximately 72% of the country's land is already used for agriculture, and the area has not increased in recent years, leaving little room for development, so expansion of farmland area will not be considered. In addition, in Nigeria, land consolidation is usually carried out together with irrigation development, so it is included in irrigation facilities.

4.3.1 Challenges at national level

(1) Production infrastructure (irrigation facility)

1) History of public irrigation development in Nigeria ^{161, 162}

Since many public large-scale irrigation facilities were constructed in the 1970s, their functionality has deteriorated due to lack of ownership, degradation, vandalism, etc. due to lack of ownership by beneficiary communities, and large-scale rehabilitation is required. In addition, farmers' opinions were not reflected in planning, and projects were implemented top-down, resulting in a decline in water use and water fee payments. In response, participatory irrigation management began to be adopted in some irrigation schemes from the 1990s, and in 1998 the National Council of Water Resources (the highest policy-making body in the water sector) obligated all organizations related to irrigation projects to introduce participatory irrigation management (PIM) in their operation and maintenance.

Various policy initiatives were undertaken between 1998 and 2007, but they did not yield sufficient results. The major issues were (a) insufficient division of roles and coordination among government agencies related to irrigation, (b) insufficient ownership by beneficiaries, and (c) weak financial sustainability. For this reason, between 2006 and 2013, efforts were made to build a consensus based on reflection on the past. In 2014, the then FMWR (Federal Ministry of Water Resources, now Federal Ministry of Water Resources and Sanitation (FMWRS)) signed the Sector Policy Statement on Large-Scale Public Irrigation Projects. This is the legal basis for the transfer of tertiary irrigation and drainage facilities from FMWR to registered WUAs under the Water Resources Act 1993. It was institutionalized to the target irrigation projects of WB's TRIMING (Transforming Irrigation Management in Nigeria Project) with its start. This system was included in the National Water Resources Bill, which was expected to be enacted after 2015, and once enacted, it was expected to be institutionalized nationwide.

However, the bill has not been enacted due to opposition from state governments, who argue that it would strengthen the control of the federal government and weaken the authority of state governments.¹⁶³

2) Situation of existing irrigation facilities

According to "Irrigation in Nigeria, Towards National Food Security, Irrigation and Drainage Department of Federal Ministry of Water Resources, 2020", the total irrigated area of 323 large, medium and small scale projects is 138,000 ha, while the irrigated area is 95,000 ha. The table below shows the irrigated area in each state.

¹⁶¹ Water User Association And Scheme Management Development Under The Transforming Irrigation Management In Nigeria (TRIMING) Project, 3rd World Irrigation Forum, 2019

¹⁶² Transforming Irrigation Management in Nigeria Project, Project Appraisal Document, WB, 2014

¹⁶³ <https://www.premiumtimesng.com/news/top-news/557260-controversial-water-resources-bill-must-be-passed-into-law-minister.html>, etc.

Table 4-14 Irrigation area of states at each status (excluding FCT)

State	Potential Area (ha)	Planned Area (ha)	Developed Area (ha)	Cropped Area (ha)
LAGOS	141	141	141	135
CROSS RIVER	225	225	197	197
KANO	29,170	8,765	18,907	10,507
SOKOTO	11,533	2,890	6,626	5,336
ANAMBRA	7,550	5,000	4,090	3,643
NASARAWA	15,937	10,853	8,519	5,440
ABIA	312	188	146	106
ZAMFARA	50,000	23,000	23,000	5,000
JIGAWA	14,573	12,438	6,483	6,390
KATSINA	14,455	5,885	6,193	886
BENUE	8,610	4,650	3,400	1,363
DELTA	600	500	220	220
KADUNA	8,835	4,175	2,690	390
EKITI	200	130	60	70
RIVERS	200	89	60	60
ENUGU	5,354	5,354	1,302	1,302
KWARA	11,053	4,220	2,398	1,798
KOGI	15,550	7,640	3,315	1,810
BAUCHI	4,615	1,200	720	630
ELTA	100		15	15
IMO	2,181	222	309	479
NIGER	41,316	12,777	5,708	5,702
AKWA IBOM	1,746	451	240	182
OYO	8,670	3,670	1,180	1,175
GOMBE	53,335	6,590	6,663	4,850
KANO & JIGAWA	2,115	2,115	248	0
PLATEAU	9,925	2,366	1,113	465
YOBE	293,675	170	27,519	27,219
BAYELSA	6,600	100	494	494
EDO	695	350	45	45
ADAMAWA	39,300	2,200	2,221	6,920
KEBBI	23,750	1,550	1,250	1,000
OGUN	12,779	3,550	597	570
TARABA	38,233	38,020	1,683	333
ONDO	3,100	1,000	50	50
EBONYI	100	100		
Total	736,531	172,573	137,801	94,780

Source: Irrigation in Nigeria, Towards National Food Security, Irrigation and Drainage Department of Federal Ministry of Water Resources, 2020

The operation and maintenance of public irrigation schemes is mainly carried out by RBDAs and state governments, with farmers also participating in some irrigation schemes. Many of the irrigation and drainage facilities in the irrigation scheme are in dilapidated condition, with pumping facilities in need of repair or renewal, and canal structures showing damage, aging, weeds, and sedimentation.

Although many public small-scale irrigation schemes in the southern region are being operated efficiently by RBDAs, some public large-scale irrigation schemes are not operated smoothly, have low cropping rates, and difficulties to maintain developed facilities.

Additionally, although gravity irrigation schemes have relatively low maintenance costs and fewer problems with mechanical facilities, many public irrigation schemes use pumps, which are subject to aging, breakdowns, repairs, and high fuel costs being a burden. Most of the pumps were purchased in the 1980s and spare parts are not available. The canals are in a state of damage, aging, overgrowth of weeds, and sedimentation.

The scheme hardly allocates maintenance personnel, and the equipment and personnel at the RBDAs' workshops are also low. Spare parts are rarely in stock, but records are not kept. 164

In addition, since many public large-scale irrigation facilities were constructed in a top-down manner in the 1970s, their functionality has deteriorated due to lack of ownership by beneficiaries, lack of maintenance, deterioration, etc., and large-scale rehabilitation is required. As mentioned above, water use and water fee payment have decreased.

Since the 1990s, efforts have been made to introduce PIM, build consensus on the division of roles among government agencies, and provide legal support for the transfer of tertiary irrigation and drainage facilities to WUAs. TRIMING is being carried out based on those.

3) Situation of TRIMING

TRIMING, supported by the World Bank, is a 2014-2024 project with four components: 1. Water resource management and dam operation improvement (\$108 M), 2. Irrigation development management (\$355 M), 3. Agricultural productivity improvement and value chain support (\$44 M), and 4. Organizational development and project management (\$53 M) (total \$560 M), and rehabilitation of irrigation facilities and development of water users' associations are being carried out in component 2. The target projects for rehabilitation are as shown in the table below, and the criteria for selecting the projects are: (1) gravity irrigation is possible, (2) the area is over 2,000 ha, (3) there is sufficient water resources, (4) the farmer-occupier land system is desirable, (5) the existing irrigation areas require rehabilitation., and (6) they do not involve significant migration.

Table 4-15 Target irrigation schemes of TRIMING

Irrigation scheme	State	Present irrigation area, ha	Area after improvement, ha	No. of farmers	Direct beneficiary
Bakolori	Zamfara	8,000	21,000	50,000	370,000
Middle-Rima Valley	Sokoto	2,000	(5,000)	15,000	105,000
Kano River	Kano	12,000	15,000	40,000	320,000
Hadeija Valley	Jigawa	5,000	6,000	25,000	200,000
Dadin Kowa	Gombe	(100)	(3000)	10,000	70,000
Total	-	27,100	50,000	140,000	1,065,000

→revised 37,600

Note: Figures in () are not direct targets of the project.

¹⁶⁴ The project for review and update of Nigeria national water resources master plan, JICA, January 2014

Source: Transforming Irrigation Management in Nigeria Project, Project Appraisal Document, WB, 2014

Based on reflections on past public irrigation developments, the success of this project is based on (a) government commitment for financial sustainability and institutional reform, (b) appropriate service provision from irrigation water suppliers to beneficiaries, (c) WUA participation and strengthening; and (d) farmers' willingness and ability to pay maintenance costs. In response, it was decided to apply three principles in each irrigation project; (i) ensure self-supporting maintenance costs for autonomy at the scheme level; (ii) participatory water management to strengthen WUA organizations and ensure responsibility, and iii) support for improving farmers' productivity. Technical cooperation is also being provided to establish participatory water management.

Strengthening water user associations and establishing maintenance and management systems are carried out in subcomponent 2.2 of component 2: Improving irrigation management. Activity 2.2.1: training process design involves creating training materials, and activity 2.2.2: WUA training are conducted. These will take the form of technical cooperation, including the establishment and strengthening of WUAs, the creation of maintenance manuals, and training for WUA representatives and RBDAs. Regarding support for operation and maintenance (O&M) costs, the plan is to gradually reduce the proportion of the project's burden, and eventually have it all covered by water fees.¹⁶⁵

【WUA strengthening in TRIMING】¹⁶⁶

TRIMING uses GIS and satellite images to create a cadastral map and a list of the farmers of each farm plot, and has built a system that collects water fees based on the area.

Within TRIMING, a unit WUA at the tertiary canal level, a sector WUA at the secondary canal level, and an overall WUA federation (Apex WUA) have been established. WUAs at each level are responsible for maintaining and managing irrigation and drainage canals, managing water distribution, collecting water fees, and mediating disputes. Representatives from the lower tier WUA become members of the upper tier WUA. WUA Federation was initially registered as a cooperative with the state government, but later registered with the Corporate Affairs Commission as a national NGO. Ten executives meet monthly, and a general meeting is held every cropping season (twice a year). It also has a constitution and bank account, and elections for officers are held every four years.

Additionally, within TRIMING, the SEC (Scheme Executive Council) has been newly established, and the beneficiaries and the RBDA, which is the administrator of the irrigation projects, work together to manage water fees, the O&M of the main canal level through coordination and decision-making.

Table 4-16 Progress of TRIMING

PDO Indicator	Nov.22	Apr.23	Nov.23	Target
1) Direct project beneficiaries (#)	785,000	900,000	950,000	1,000,000
2) Area Provided with irrigation & drainage services (ha)	25,562	27,299	30,056	37,600

¹⁶⁵ Transforming Irrigation Management in Nigeria Project, Project Appraisal Document, WB, 2014

¹⁶⁶ Water User Association And Scheme Management Development Under The Transforming Irrigation Management In Nigeria (TRIMING) Project, 3rd World Irrigation Forum, 2019

3) Cropping Intensity (%)	175	175	188	170
4) Irrigation fee recovery rate WUA (%)	34.9	35.1	43.2	80

Source: FMWRS, December 2023

The table above shows the number of beneficiary farmers, irrigated area, and water fee collection status of TRIMING. The irrigated area has steadily expanded, the number of beneficiary farmers has increased, and water fee collection is also being carried out.

4) Situation and challenges of WUA

The number of irrigation projects (IPs) and the status of WUAs by management entity were studied in Kwara, Oyo, and Taraba states, and the summary is as follows.

Table 4-17 Irrigation projects in each state

State	Scale	Management entity			Total
		State	RBDA	Private	
KWARA	Large	0*	5		5
	Medium	1	4	1	6
	Small	2	2		4
	Sub-total	3	11	1	15
OYO	Large		3		3
	Medium	5	2		7
	Small		1		1
	Sub-total	5	6		11
TARABA	Large		1		1
	Medium	1	1		2
	Small	2		1	3
	Unspecified	1			1
	Sub-total	4	2	1	7
Total		12	27	4	43

Source: Irrigation in Nigeria, Towards National Food Security, Irrigation and Drainage Department of Federal Ministry of Water Resources, 2020

*1: It was previously managed by the state government, but due to difficulties in continuing maintenance, it is now managed by the RBDA

Table 4-18 WUAs' situation in 3 states

Management entity	Status of WUAs (No. of IPs)			Total
	EXISTING	FORMATIVE STAGE	NON EXISTING	
State	3	1	7	11
KWARA	0	1	2	3
OYO			5	5
TARABA	3			3
RBDA	16	6	4	26
Private/ state			1	1
Private			3	3
Total	19	7	15	41

Source: Irrigation in Nigeria, Towards National Food Security, Irrigation and Drainage Department of Federal Ministry of Water Resources, 2020

* Figures in Table 4-17 and Table 4-18 are slightly different because of timing.

Looking at the status of WUAs by management entity, there are a total of 11 IPs managed by the state governments (Kwara, Oyo, and Taraba states), but only 4 IPs (36 %) have WUAs, and the remaining 7 IPs do not have (64%). On the other hand, of the 26 IPs managed by RBDA, 85% have already WUAs or are in the process of forming, and 4 IPs (15%) do not have. RBDAs are actively promoting the establishment of WUAs.

Additionally, according to interviews with FMWRS, there are plans to strengthen WUA nationwide, following the example of TRIMING's efforts, regarding the functions of WUA that have so far been insufficient. A personnel in charge of WUA has been appointed within the Irrigation and Drainage Department and is working with each RBDA to strengthen WUA.

Based on the above, the lessons learned from the past have been put to use, and TRIMING has already been put into practice and results have been produced, so the O&M of irrigation facilities and water management will be carried out with reference to TRIMING. Furthermore, for implementation, current situations are investigated and improvements are considered as necessary.

(2) Distribution infrastructure

1) Rural road

In rural areas, road networks are lacking or in poor condition, which not only increases the cost of agricultural product distribution, but also narrows the range of activities of local residents and hinders education, medical care, and business in addition to agriculture. The impact on local residents would be significant if they are improved. The road density in Nigeria is about 22 km/100 km², and it is as low as 1/6 of the road

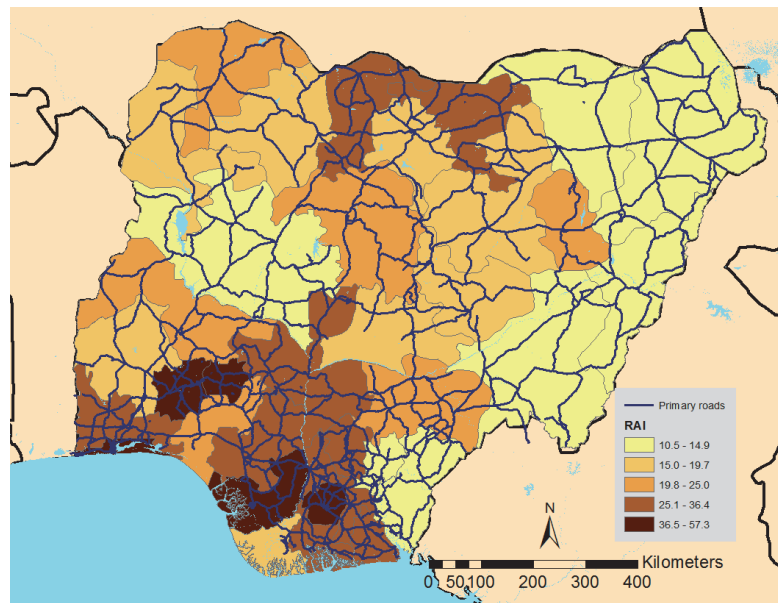


Figure 4-8 RAI of states

Source: World Measuring Rural Access: Update 2017/18

density in India, whose gross national income per capita is slightly lower than Nigeria (Nigeria; US\$ 2,100, India; US\$ 1,880), which is 142 km/100 km². The RAI (Rural Access Index, the percentage of people who have a year-round road within a 2 km walking distance) is 25.5%, so 3/4 of rural residents have poor access to the road network. The national distribution of RAI is shown in the figure above, with some states in the south having over 40%, while in the east it is as low as 10%. Additionally, 87% of local roads are in poor condition, and improvements are required. Although state and local roads are

practically under the jurisdiction of state governments, many states do not have the structure or budget to develop, maintain, and manage local roads.¹⁶⁷

On the policy side, the rural development section of the NDP (2021-2025) positions infrastructure development in rural areas, including roads, as important, and the KPI for this section is to increase the length of rural roads by 20% by 2025. Furthermore, infrastructure development in rural areas is listed as one of the cross-cutting intervention measures within NATIP, and rural road development is mentioned along with irrigation, etc.

Past donor projects for rural road development can be organized as shown in the table below. A map of the states for WB support is shown in the figure below.

Table 4-19 Donor projects for rural road development

Project	Donor	Period	Amount M\$	States	General
RAMP I	AfDB	08.6-12.1	59 GN 4	Cross River	Appraisal Report, May, 2007. Implemented by State Ministry of Works. Rehabilitation of state road 474 km.
	WB	04.4-13.3	60 GN 12	Kaduna	RAMP I Project Appraisal Document, March 2008. Rehabilitation of rural road 427 km and 132 bridges.
RAMP II	WB, AFD	13.2-18.12	170 60 GN 13	Niger, Adamawa, Osun, Enugu, additional Imo	Project Appraisal Document, August 2012. 5 states. Implemented by State Ministry of Works. Rehabilitation of rural road 825 km (excluding Imo)
RAAMP	WB, AFD	20.2-26.6	280 230 GN 65	Sokoto, Kebbi, Katsina, Kano, Bauchi, Plateau, Kwara, Kogi, Oyo, Ogun, Ondo, Abia, Akwa Ibom	Project Appraisal Document, January 2020. 13 states. Implemented by State Ministry of Works. RAMP II showed capacity differences among states, so unused portion will be cancelled. Although Kwara's development plan says 60 M\$/state, PAD says the amount of budget is not fixed, but an upper limit is set on the amount of works.

Source: Study Team based on Rural Access and Mobility Project, Appraisal Report, AfDB, May 2007, Project Appraisal Document for Rural Access and Mobility Project-Kaduna (RAMP I), WB, February 2008, Project Appraisal Document for Second Rural Access and Mobility Project (RAMP 2), WB, August 2012, Project Appraisal Document for Nigeria Rural Access and Agricultural Marketing Project (RAAMP), WB, January 2020

¹⁶⁷ Project Appraisal Document for Nigeria Rural Access and Agricultural Marketing Project (RAAMP), WB, January 2020

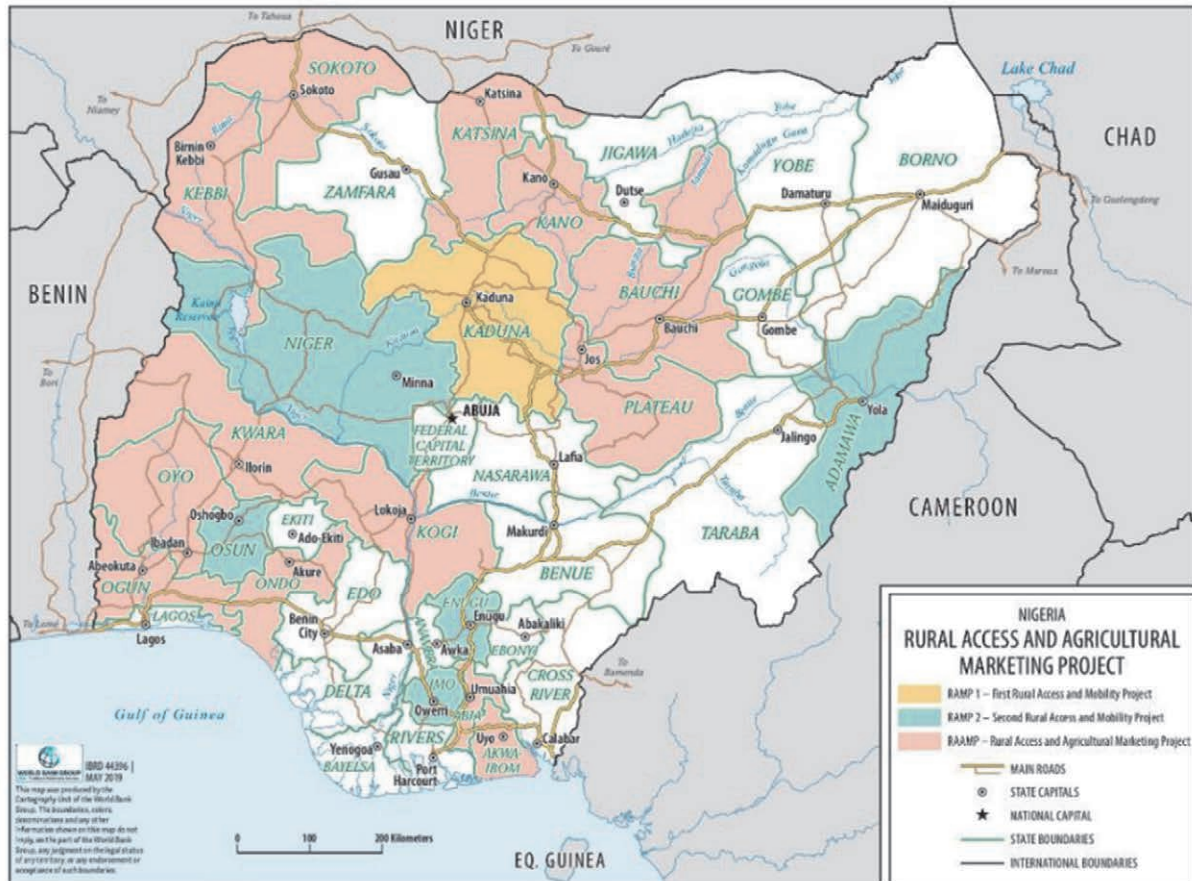


Figure 4-9 Project map of RAAMP

Source: Project Appraisal Document for Nigeria Rural Access and Agricultural Marketing Project (RAAMP), WB, January 2020

2) Market facility in production area

Regarding market facility in rural areas, the plan of RAAMP (Project Appraisal Document for Nigeria Rural Access and Agricultural Marketing Project (RAAMP), WB, January 2020) provides an overview of the current situation and improvement measures.

Nigeria has many rural markets facing various challenges such as lack of physical access and affordable transportation, opaque land ownership, poor market management, lack of trading infrastructure and amenities, poor or inadequate storage and processing facilities, and opaque market trading platforms. Rural markets generally lack the infrastructure to handle agricultural products that require specialized handling and waste management procedures. Additionally, many SMEs operating in rural markets are run by women, and they do not have access to credit, are not familiar with modern business practices, and lack or have limited access to pricing information.

Therefore, RAAMP is planning to improve the facilities of the existing agricultural distribution center. Specifically: (a) open market shades and multiple small-storage-facilities; (b) infrastructure for specialized handling; (c) internal market paths, drainage infrastructure, toilets and water facilities; (d)

temporary storage for waste; (e) office facilities for the market management committee, and (f) parking and loading facilities, with specific details to be determined for each market.

Target sites will be selected for each state from among existing local markets, taking into consideration factors such as regional importance and access to major roads. The expected quantity was 5 sites in each state, a total of 65 sites in 13 target states, and a total budget of USD 74 million. But according to the October 2023 Implementation Status and Results Report¹⁶⁸, some facilities are still in the design stage and are expected to be completed in the fourth quarter of 2024. Meanwhile, due to inflation and exchange rate fluctuations, the target was revised downward to three sites in each state. However, there are difficult prospects for its completion.

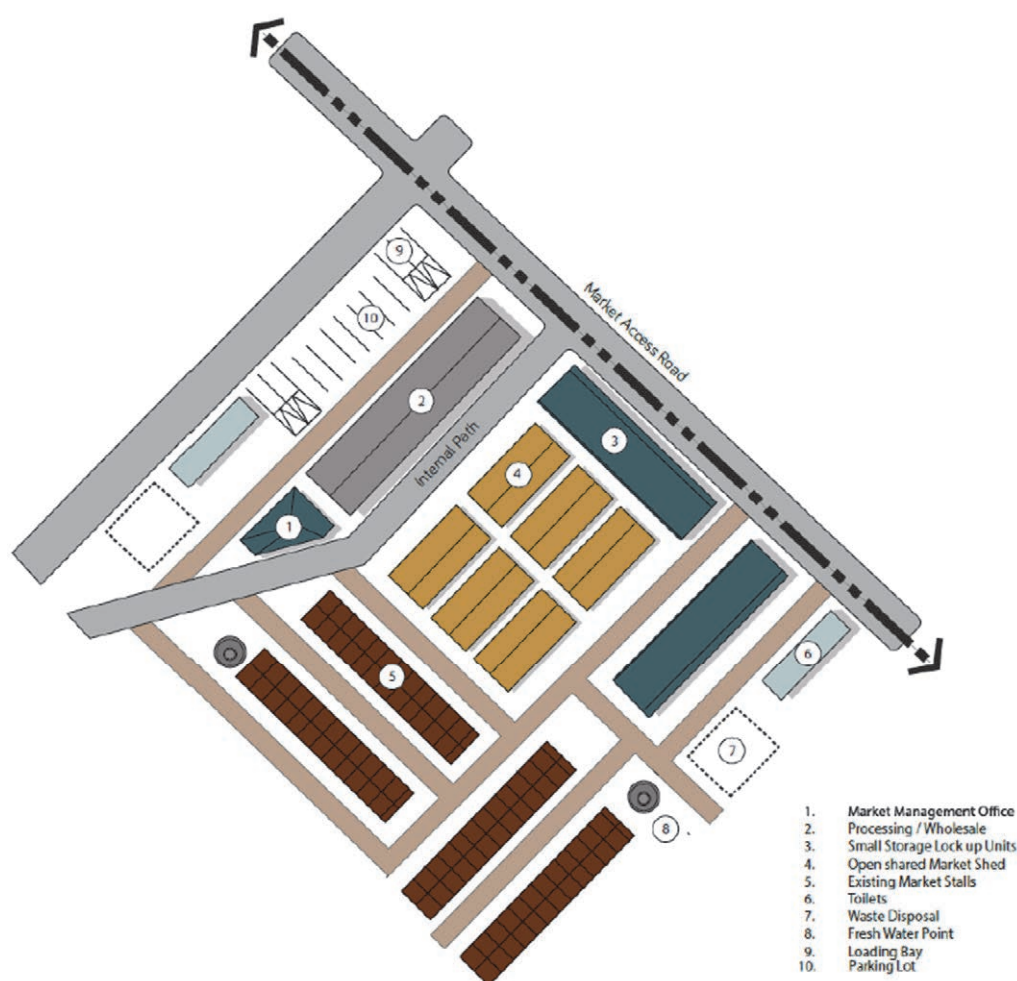


Figure 4-10 Image of market improvement

¹⁶⁸ <https://documents1.worldbank.org/curated/en/099102723163085415/pdf/P1633530e8eeda07c0a28906b90a74806bc.pdf>



Figure 4-11 Open sheds and mini storage facilities



Figure 4-12 Wholesale facilities and parking/loading bays

(3) Post-harvest infrastructure

1) Storage facility ¹⁶⁹

< Policy > The three-tier storage policy was launched in 1987: the federal government-run strategic grain reserve, the state-run buffer stock, and the on-farm storage program. At the national level, it targets maize, sorghum, millet, rice, soybean, and gari (cassava flour). Separately, private storage is also carried out for business purposes.

< Situation and challenges > At the national level, the goal is to store 5% of grain, but only about 1% of the grain has been stored. There are 33 state-owned grain silo complexes nationwide, totaling 1.336 million tons, but only 46% (610,000 tons) is operational, and the causes include malfunction due to

¹⁶⁹ Strategic Food Reserve in Nigeria, An Assessment of Optimal Stock Levels and Storage Capacity, AGRA, March 2023

aging facilities and equipment, flooding, wind damage, rehabilitation, and construction. Furthermore, when looking at the usage status in recent years, it has remained between 20,000 and 80,000 tons, and the utilization rate is low. This is due to budget shortages, organizational issues, staff capacity, lack of surplus grain, and avoidance of market intervention. FMAFS's Food & Strategic Reserve Department has jurisdiction over the silos, but the 17 silos are operated by private companies on a concession basis to ensure efficient operation. Some facilities are in need of rehabilitation, and private operators are required to improve operational efficiency and increase utilization rates.

The main purpose of the state buffer stock, unlike that at the national level, is to reduce post-harvest losses for farmers. Although the country's policy goal is to stockpile 10% of grain, its capacity remains significantly lower than that of the national. It operates as a business except in times of disaster, and the utilization rate is estimated to be less than 5%, reflecting the difficult financial situation. Unlike federal government-run silos, there is no function for long-term storage of more than six months.

Efforts at the farmer level included training for farmers at the beginning of the program, but this was not continued thereafter. In terms of post-harvest losses, improvements are required since the losses at the farm level are large.

At the private level, business entities buy at low prices and sell at high prices, and processing companies buy at low prices and stockpile them, and when prices are high, they use the stock as raw materials. According to the survey results in Osun and Oyo states, the private sector accounted for 77% and 99.5% of the storage capacity, respectively.

The operation of public reserve is severely restricted due to financial constraints, so financial and policy support is required.

2) Processing facility

In Nigeria, the food processing sector is dominated by SMEs, and as in many countries around the world, they have the potential to create jobs, especially in rural areas, improve income distribution, reduce post-harvest losses and increase food availability. It has played an important role in economic development. Small-scale food processing enterprises are generally organized as family businesses or privately owned, have small investment scales, relatively simple technology, and relatively high demand for labor. Food and beverage production is very important in terms of the number of employees, and there are many food processing companies in each state across the country. However, the rapid development of the small-scale food processing industry has been hampered by inefficient and inappropriate technology, poor management, insufficient capital (difficult to access financial institutions, high interest rates, low profit margins, etc.), limited research and development capacity, rural infrastructure, intense competition from imports, and a lack of clear policies.¹⁷⁰ Processing techniques, methods, products, etc. for major crops are summarized in the table below.

¹⁷⁰ Small-scale food processing enterprises: measures for national development and addressing food security challenges in Nigeria, International journal of scientific and technical research in engineering (IJSTRE), August 2016

Table 4-20 Processing of major crops

Crop	Product	Process	Note
Cassava	garri	peeling, drying, grating, pressing/fermenting, sifting, frying and drying	Some small-scale garri processing factories have successfully replaced some of the traditional manual tasks such as grating, pressing, and sieving with machines. It is also processed into feed and starch.
	flour	peeling, cleaning, slicing/chipping, drying, grinding and sieving	
Yam	flour	peeling, washing, slicing, drying, grinding and sieving	It is also processed into flakes. A method for producing instant yam flour has been developed.
	fufu	peeling, cutting, washing, cooking and pounding	
Maize	flour	cleaning, sorting, degerming, drying, milling and sieving	It is also processed into corn flakes, Akamu (fermented baby food), Agidi (jelly), etc.
	corn oil	soaking, steeping, degerming and oil extraction	
Rice	milling	threshing, cleaning, grading, parboiling, steaming, drying, milling, destining, size grading	Rice processing is fully mechanized in Nigeria.

Source: Study Team based on Small-scale food processing enterprises: measures for national development and addressing food security challenges in Nigeria, International journal of scientific and technical research in engineering (IJSTRE), August 2016

Looking at the situation of processing of major crops in rural areas, 70% of cassava processing is done at small and medium-sized processing plants in rural areas, and in 2012, approximately 3 million people were employed at 75,000 processing plants nationwide. Cassava needs to be processed within two days after harvesting, making it difficult for processors to secure raw materials, and large factories tend to have low operating rates.¹⁷¹ Although yams are mostly eaten raw, informal processing industries have long produced flakes, flour, and chips in the southwest. More than 10 formal processing companies produce yam flour, frozen chips, etc., among other food products.¹⁷² Regarding maize, the history of flour milling dates back to the early 19th century when it was introduced by the British, but it experienced significant growth in the 1960s when urbanization progressed, and there are now over 100 flour milling companies. These companies are relatively large-scale and are also working on contract farming with farmers.¹⁷³ Regarding rice, approximately 95% of processors are small-scale operators using old-fashioned facilities with low production capacity, and Lafia, the capital of Nasarawa State, is a major concentration of rice mills, with more than 700 small rice mills in operation.¹⁷⁴

In terms of policy, although there is no specific policy for agricultural processing, the NDP calls for efforts to strengthen linkages with food processing companies and improve processing and added value in rural areas in order to strengthen the agricultural value chain. NATIP also aims to establish 100 processing centers and promote SAPZs in order to strengthen the value chain of major crops. The 100 processing centers are based on the 142 locations proposed in the Green Imperative Plan (GIP)

¹⁷¹ Cassava Production and Processing, Gro-Intelligence, 30 April 2015

¹⁷² Yam Improvement for Processing, Nigeria, Bill & Melinda Gates Foundation, April 2014

¹⁷³ Overview of Corn Milling in Nigeria: Supporting Farmers and the Economy, Livegenuinely, 2023.6.15

¹⁷⁴ Assessment of Postharvest Handling and Quality Control Practices of Rice in North Central Nigeria: A Case Study of Lafia, Nasarawa State, Journal of Developments in Sustainable Agriculture, 2011

(sometimes called Plan, Project, or Programme), which Brazil and others are planning to support. However, the progress of the GIP has not been able to confirm since the concept was announced in 2020.

4.3.2 Current status and challenges of agricultural infrastructure in the surveyed states

(1) Selection of states to survey

In order to conduct a survey of the actual state of agricultural infrastructure development in the second field survey, target states were selected. As for the selection procedure, first, at the time of second field survey planning, from among the 18 states (see table on the right) that are rated at Ministry of Foreign Affairs' risk level 2 (no non-essential travel) or lower, and where there is a possibility to visit. The five states (circled in the table on the right) were confirmed that they were actually allowed to travel under JICA's safety standards. On the other hand, since public irrigation projects were also strong candidates for support projects, projects with F/S completed were confirmed among the 33 priority public irrigation projects listed by FMWRS. As a result, there were two states, Nasarawa and Kwara, that cleared the safety aspect and F/S, and these were selected as the target states for the second field survey (states marked with ⊙ in the table on the right).

Table 4-21 Target states for the second field survey

Zone	No	State	Possibility to visit by JICA' security, 2023,10	FMWRS's projects		States to survey
				No.	With FS	
NE	1	Taraba	△*1	2	2	
NC	2	Benue	×	0	0	
NC	3	FCT	○	0	0	
NC	4	Kwara	○	1	1	⊙
NC	5	Nasarawa	○	3	2	⊙
NC	6	Plateau	×	1	1	
SE	7	Abia	×	0	0	
SE	8	Ebonyi	×	0	0	
SE	9	Enugu	×	0	0	
SS	10	Akwa Ibom	○	1	0	
SS	11	C/Rivers	×	1	0	
SS	12	Edo	×	0	0	
SW	13	Ekiti	×	0	0	
SW	14	Lagos	○	0	0	
SW	15	Ogun	×	1	1	
SW	16	Ondo	×	0	0	
SW	17	Osun	×	0	0	
SW	18	Oyo	△*2	4	1	
		Total		14	8	

△*1: At the time of planning the second field survey, there were no flights available. It seems flying later.

△*2: At the time of planning the second field survey, it was not allowed to visit. It is possible as of the end of October.

(2) Overview of surveyed states

1) Nasarawa State

Nasarawa State is adjacent to the east of the capital, Abuja, and is located in the North-Central geopolitical zone (the country is classified into six zones based on regional characteristics: Northwest, North-Central, Northeast, Southwest, South-South, and Southeast). The area is 28,735 km² (12th out of 37 states), the population is 2.51 million (36th out of 37 states), and the population density is 87.4 people/km². It has a large arable area of 60-70% of the area and has the advantage of being close to the Abuja market. The main crops are rice, soybean, yam, sesame, and maize, and there is a high potential for irrigated agriculture towards the Benue River on the southern edge of the state. It is a region with a

thriving agricultural and livestock industry, with 80% of the population engaged in agriculture and livestock, and related industries.

2) Kwara State

Kwara State is also located in the North-Central geopolitical zone, with an area of 35,705 km² (10th), a population of 3.17 million people (33rd), and a population density of 89.0 people/km². It is located on the LAKAJI (Lagos-Kano-Jibiya) corridor that connects Nigeria's breadbasket region in northern Nigeria with the largest city in the south, Lagos, with the Niger River flowing along the northern edge of the state. Rice, maize, groundnut, sesame, and cassava are the main crops, and catfish farming is also popular, and in recent years, livestock farming has also been focused on. More than 40% of the state's working population is engaged in agriculture, and numerous agricultural and agro-processing enterprises are operating in the production of livestock, rice, cassava, sugar, etc.



Figure 4-13 Location map of target states for second field survey, capital Abuja and largest city Lagos

(3) Development plans of states

1) Nasarawa State (Nasarawa Economic Development Strategy (NEDS) 2019-2023)

The vision is to be among the top three most competitive states in Nigeria by 2023 in terms of sustained accelerated growth, increased economic opportunity and prosperity, social inclusion and improved quality of life for residents. The strategy is to utilize five game changers (employment, industrial promotion, infrastructure development, human resources development, urban renewal and housing development) and to develop six sectors (agriculture, mining, health/education, power/transport, industry/trade/tourism and public safety).

【Agricultural sector】

Nasarawa State is one of the leading agricultural states in the country, with an average of 80% of its residents engaged in agriculture and agro-related activities such as agriculture, animal husbandry and agro-processing. Transforming the agricultural sector is critical to achieving NEDS' economic development and social welfare priorities, as it contributes significantly to food security, wealth and job creation, and growth.

Challenges include low education level of farmers and poor access to finance, lack of irrigation, limited extension services, unclear land ownership system, utilization of young people, instability of

agricultural product sales prices, weak farmer organizations, the lack of a post-harvest value chain, the provision of agricultural processing and market infrastructure, and the lack of monitoring and evaluation.

In response, the strategy is to commercialize agriculture, improve the environment to promote investment in agriculture, promote employment of young people by promoting agribusiness, promote market access and trade, improve storage and refrigeration facilities, promote private agricultural processing businesses, modernize agriculture through agricultural machinery and irrigation, and increasing the income of farmers and related parties.

2) Kwara State (Kwara State Sustainable Development Plan (KSSDP) 2021-2030)

The vision is to be Nigeria's leading destination, investing in human resources and delivering critical infrastructure in a sustainable and inclusive manner, tempered by good governance and the fear of God. For this purpose, four pillars and sub-sectors within each pillar are established, and the details are shown in the table below.

Table 4-22 Pillars and sub-sectors of KSSDP

No.	Pillar	Sub-sector
1	Governance and institutional strengthening	Financial environment, public service reform, public safety
2	Economic development	<u>Agricultural value chain development and poverty reduction</u> , medium-term macroeconomic framework, PPP and investment promotion, cultural and tourism development, enterprise and industry
3	Social development	Healthcare development, education sector development, community engagement and social welfare development
4	Infrastructure development	Electricity, transportation (roads, air, railways), ICT development, housing development, social health/education/community development

【Development of agricultural value chain and poverty alleviation】

Regarding agriculture, the main challenges include insufficient farmer and farmland data, lack of funds, lack of infrastructure, poor roads, conflicts between farmers and herders, climate change countermeasures, introduction of climate smart agriculture, quality of agricultural products, lack of commercial agriculture, lack of monitoring and evaluation, unequal land distribution by gender, and access to agricultural inputs. Countermeasures include legalizing agricultural development funds, establishing a farmer and farmland data bank, rehabilitating local roads with a view to agricultural development, hiring consultants to lead development plans, implementing awareness campaigns for farmers, establishment of training programs for farmers, and recruitment of new agricultural extension workers.

Regarding poverty reduction, the Kwara Social Investment Program (KWASIP) provides supports such as technical training, agricultural support, vocational training, small and medium enterprise training and business advisory. Rural development is progressing through infrastructure development by the RBDA, the Department of Food, Roads and Rural Infrastructure, and ADP, and through the Rural Access and Agricultural Marketing Mobility Project (RAAMP) supported by the World Bank. Countermeasures include conducting a census to understand the actual situation, improving financial management of local governments, developing infrastructure that takes agriculture and mining into consideration, introducing

community police, promoting investment, planning rural development programs, using agriculture and rural development funds and collaboration between the national and state governments for rural development.

(4) Situation of production infrastructure (irrigation facility)

The following is an explanation of the deterioration and current state of maintenance of the facilities in the Duku Lade Irrigation Project (Kwara State) that the Study Team visited.

< Current status of the facility > In the past, 1,000 ha was irrigated throughout the year, but due to the reduction in water storage capacity due to sedimentation in the reservoir upstream of the weir and the decline in the functionality of the intake weir, only 100 ha can be irrigated at present.

Eight hundred (800) ha of farmland is irrigated from an intake weir whose water source is Lade River, but the intake weir was built in 1957 and it is old and deteriorated. The water level is controlled by six gates on the main river, but five gates have been lost, making water level control difficult. Farmers were trying to raise the water level as much as possible for irrigation during the dry season by installing stop logs.

The river bed is lowering downstream of the weir, which is affecting the stability of the weir. Additionally, several years ago, the right bank embankment upstream of the weir was washed away by overflow, but farmers rebuilt it. The dredging of the main canal is carried out manually by farmers, and its functionality is barely maintained.



Upstream view, 5 gates lost



Downstream, river bed lowered



WUA dredging the main canal



Rice cultivation during rainy season

< Operation and maintenance system > Previously, it was managed by the state government, but due to the deterioration of the facility, the impact has become significant, so the Lower Niger River Development Authority (LNRBDA) has undertaken operation and maintenance under the supervision of the Federal Ministry of Water Resources and Sanitation (FMWRS) and also provide support in terms of farming. A water user association has been formed and it consists of 10 subdivisions called sectors. It has 500 members, including a chairman, secretary, deputy secretary, financial secretary, and treasurer, as well as regulations. Irrigation associations carry out tasks such as water distribution planning, accounting records, and maintenance work. The water usage fee is N 5,000 /ha/crop season, but due to the decline in irrigation function, currently only N2,500 or less is paid. If payment is not made, the village chief will mediate.

< Maintenance plan > FMWRS has conducted a feasibility study on the irrigation area and has prepared a N12.6 billion business plan for the construction of dams, headrace canals, main canals, terminal canals, roads, buildings such as offices and warehouses, and the expansion of the irrigation area. These are also included in the FMWRS priority irrigation project list. However, FMWRS does not have a budget and is seeking donors for support.

< Countermeasures > Large-scale irrigation development is being carried out under the initiative of the government, and WB is implementing TRIMING, which includes maintenance and water management, so it is better to respond in accordance with this. In addition, in order to improve agricultural productivity, it is necessary to disseminate farming techniques, establish producer associations, and improve marketing.

(5) Status of distribution infrastructure

1) Rural roads

< Framework for developing policies and plans > Improving market access is one of the goals in the agricultural sector of Nasarawa State's state development plan. The state development plan for Kwara State cites poor rural roads as one of its weaknesses, and plans to promote RAAMP supported by WB and AFD. It has been confirmed that there is a high need for rural road development in the agricultural transformation plan.

< Implementation plan and system/method > In Nasarawa State, the BRD (Bureau of Rural Development) under the state Ministry of Public Works, Housing and Transport is responsible for the maintenance of rural roads. Although BRD does not have a long-term plan, it updates its business plan every year, requests budget, and implements projects. In Kwara State, rural roads improvement and market facilities development have been planned with a budget limit of \$60 million per state in RAAMP. The state implementing agency is the Department of Public Works and Transportation.

< Current status and challenges of facility ownership, operation, and maintenance > Nationwide, rural roads are under the jurisdiction of state governments. In Nasarawa State, BRD constructs and rehabilitates rural roads, leaving simple maintenance to the communities. Between 2019 and 2022, BRD has constructed 27 routes covering 306 km (average 76.5 km/year). Laterite pavement is the main material, and in some cases only clearing and grading is done, and as it is not very durable, maintenance and rehabilitation are important. In order to meet the large demand for maintenance, it is necessary to strengthen the budget and personnel. The length of roads in Kwara State is 11,651 km, of which 104 km are national roads and the rest are under the control of the state and LGA, but are practically under the jurisdiction of the state government. The state Department of Public Works and Transportation is constructing and rehabilitating roads, but it is not keeping up with maintenance demand.



River crossing works under construction by BRD



Under construction area. It is difficult for normal vehicles to pass

< Fund/Technology Needs Analysis > The rural road improvement project plan for Nasarawa State in 2023 has a length of 302 km and a budget of approximately N 6 billion. The needs are great, but maintenance is not keeping up. Also, since most of the roads are unpaved, regular rehabilitation is required. In Kwara State, although RAAMP has made some progress in improving rural roads, the overall demand is large and only a portion of it can be met, so further support is needed. Additionally, the state is forced to take urgent action on important sections of national highways.

< The roles of the public and private sectors and the possibility of collaboration with the private sector > The development and maintenance of rural roads is basically carried out by the public sector, the BRD in Nasarawa State and the Ministry of Public Works and Transport in Kwara State. There is not much room for private involvement.

< Countermeasures > Rural road maintenance is carried out by the relevant department of the state government. Additionally, RAAMP, which is being implemented by WB, not only maintains and manages rural roads, but also includes the development of agricultural product distribution centers, contributing to the revitalization of agriculture, the main industry in rural areas. This direction is considered to be one of the promising options.

2) Local market

Regarding the local market, it was not possible to collect sufficient information in both Nasarawa and Kwara states. Therefore, the situation of the local market is examined here using examples of Kebbi State (Grain Storage and Marketplace Characteristics in Kebbi State, Nigeria, IFPRI, Sep. 2018) and the southern part of Edo State (Rural Market Infrastructure And Marketing In The Benin Region, Nigeria, Geo-Studies Forum, 2013).

< Framework for developing policies and plans > In the case of Kebbi State, the survey results show that public investment in market infrastructure has not been considered important, but the local governments who understand the needs of their communities should promote as it is expected to have immediate and sustainable effects. Furthermore, in the case of Edo State, it is described that the development of rural market infrastructure is important in order to improve the efficiency of marketing of agricultural products.

< Implementation plan and system/method > As shown in the next section, toilets, water supply facilities, waste treatment facilities, etc. are inadequate, and the unhygienic environment needs to be improved. There is also a high need for the development of storage facilities that can properly preserve agricultural products, space for efficient loading and unloading, and drainage facilities. Banking facilities, security personnel, gas stations, and mobile networks are also required.

< Current status and challenges of facility ownership, operation, and maintenance > According to the Edo State study, the role of local governments is to allocate land for production markets and develop infrastructure. In the case of Kwara State, market facilities are under the jurisdiction of the state government, and the state government is planning to develop the facilities within RAAMP. In the case of Edo State, the study area is 10,864 km² in the southern part of the state (approximately half of Edo State's area of 19,560 km²), within which there are 50 and 20 local markets and regional markets, respectively (one in 217 km² and one in 543 km², respectively). Ten locations are being investigated. Local markets mainly display and trade agricultural products outdoors, and although they have structures, they are simply stalls with no walls, such as wooden pillars and plastic sheets, and fees are paid to the local government council. In addition to similar stalls, local markets also have structures with block walls and tin roofs, but only a few can be locked. Sanitary conditions are poor, with inadequate toilets, water supply facilities, and waste treatment facilities. The aisles inside the market are narrow and there is insufficient space for parking, loading and unloading, leading to traffic jams on market days. For example, in Kebbi State, issues at 16 markets in the state were clarified through interviews with market traders (many of whom are also farmers), including the presidents of market traders associations. Although there are auto mechanics in all markets, some markets lack banking facilities, security guards, toilets, gas stations, mobile networks, etc., making it difficult to conduct transactions throughout the day, and increasing transaction costs and risks. There were only a few markets that did not have block-built storage units with tin roofs, but traders considered them insufficient in size and quantity, and pest and rodent damage was common. Sufficient space and drainage facilities for the rainy season were also in high demand.

< Fund/Technology Needs Analysis > RAAMP's plan estimates the unit cost for developing agricultural distribution centers to be US\$ one million per location, and is expected to develop five locations within each state that are large in scale and have good road access to serve as regional cores. The plan is to conduct a cost-benefit analysis for each facility during the agricultural distribution survey at the state level and formulate a specific business plan.

< Roles of the public and private sectors and the possibility of collaboration with the private sector > Development of the infrastructure for production markets is essentially the responsibility of the state government, with local governments responsible for supervision and management. Traders and farmers are conducting transactions while overall operations are being carried out by market traders associations and other market stakeholders. Therefore, once the facilities are developed by the government, they will be utilized by traders.

< Countermeasures > RAAMP, which is being implemented by the WB, involves the development of agricultural distribution centers including local markets, as well as local roads, which will greatly contribute to the distribution of agricultural products in rural areas. Therefore, a similar direction is considered to be one of the promising options. In addition, in the SAPZ currently being implemented by the AfDB, infrastructure for production, processing, and marketing of agricultural products will be

developed in areas with high agricultural potential near cities, and producers, processors, intermediaries, and distributors will be integrated into one zone. The aim is to make it easier to connect and reduce costs, increase productivity, and competitiveness, attract private investment, and encourage regional development. From the perspective of developing markets in production areas, promotion of SAPZ is also a promising option.

(6) Status of post-harvest infrastructure

1) Storage facility

< Policy > In Nasarawa State, one of the goals in the agricultural sector of the state development plan is to improve storage and cold storage capacity, and this will be addressed as an activity. Kwara State's Sustainable Development Plan 2021-2030 cites the lack of preservation and storage technology and facilities as well as the large amount of post-harvest loss as weaknesses.

< Implementation plan > Although there are no specific development plans in either state, Nasarawa State has 13 storage facilities and has secured storage capacity. Kwara State has a 100 ton storage facility, but further development is required.

< Current status and challenges of the facility ownership, operation, and maintenance > Both states have state-run grain silos. In Nasarawa State, the state-run silos (25,000 tons) began operation in 2019, and unstable electricity supply has become an issue. The state facilities are privately operated and require rehabilitation. Tax exemption is provided for the construction of large silos by private companies. In Kwara State, the state-run silo (10,000 tons) is old, having been built in 1984, and although the equipment is in good condition, it is not being fully utilized. It is currently operated by a private company. Private storage facilities are also opening up in various locations.

< Funding/technical needs > Regarding state-run grain silos, some facilities are in need of rehabilitation, and although they are operated by private companies, there is a need to improve operational efficiency and increase utilization rates. In addition, unstable electricity supply is also an issue. State facilities are in need of rehabilitation and expansion. Meanwhile, public stockpiles face financial challenges. There is a high demand for funds at the private level, but banks' interest rates are high and it is difficult to access them.

< Roles of the public and private sectors and the possibility of collaboration with the private sector > As for state-run grain silos and state facilities, private companies are required to streamline their operations and make full use of the facilities. Private companies are also active and further expansion is expected.

< Countermeasures > Regarding state-run grain silos, rehabilitation of aging facilities is necessary. Although there is potential for support, existing facilities are not being fully utilized due to the huge

costs involved in operating food reserves. Therefore, many silos are now operated by the private sector on a concession basis, and the food storage function has weakened. State and private storage facilities are being used for business purposes, but a lack of capacity has been pointed out, and support could be provided for the state to develop facilities and promote private sector utilization. In addition, SAPZ also targets the development of storage facilities, and support for this is also a promising option.

2) Processing facility

< Policy > In Nasarawa State, one of the goals in the agricultural sector of the state development plan is to increase the private agricultural processing business, and this will be addressed as an activity. In Kwara State, as part of its agricultural transformation plan, the aim is to establish crop storage areas, carry out adjustment and grading, and increase market value. It also cited the presence of many agricultural processing companies such as Olam, Valentine Chicken, Landmark farms, and Hillcrest Rice Processing as a strength.

< Implementation plan > In Nasarawa State, private agricultural funds and Dangote Group are planning investments for agricultural production and processing, and the state government is preparing to be selected for SAPZ II. In Kwara State, SAPZ I has started and the project implementation structure is being established. The target product is livestock, and the state government plans to construct a core hub facility and peripheral facilities with a loan from IsDB. It is also seeking the participation of private companies to operate it.

< Current status and challenges of facility ownership, operation, and maintenance > In Nasarawa State, there are hundreds of private rice milling machines operating around Lafia, but they are all old and small, making it difficult to mill rice with high quality, high efficiency, and high yield, and contamination with stones is a major issue. Olam operates a 10,000 ha rice field and rice mill. In Kwara State, primary processing of rice and cassava is carried out on a small scale by the private sector, while large-scale agricultural processing companies are also expanding into the state. The situation at rice processing vendors in Nasarawa is shown below.



Parboiling pot



Drying of unhulled rice



Scene of rice hulling



Transportation truck

< **Funding/technical needs** > As a processor, there is a demand for capital investment to expand the business, but it is difficult to obtain bank loans because the interest rate is over 20%. Regarding SAPZ, while Nasarawa State is preparing for the selection, Kwara State has started and plans to receive a loan of \$40 million.

< **Roles of the public and private sectors and the possibility of collaboration with the private sector** > Small-scale processing facilities are run by the private sector, but they have not increased or expanded due to lack of funds, so financial support is needed. In SAPZ, infrastructure development is carried out by the state government, but collaboration with private businesses that are responsible for the actual business is essential.

< **Countermeasures** > Most of the agricultural processing industry is carried out by the private sector, and facility development is also carried out by the private sector. However, as the number has not increased or expanded due to lack of funds, financial support may be an option. In addition, most of them are small-scale processors, and they lack sufficient technology and equipment. For example, in the case of rice, since the competitiveness with imported rice is low, a project to strengthen rice post-harvest processing and marketing capabilities was implemented and achieved results. However, there are still many challenges, so there is a possibility of technical cooperation support for small-scale processors.

4.4 Analysis of Current Situation in Agricultural Infrastructure and Proposal of Priority Project

4.4.1 Analysis of current situation in agricultural infrastructure and proposal of priority project

As mentioned above, agricultural infrastructure faces a variety of issues, each of which requires improvement. A summary of various agricultural infrastructure issues and countermeasures are summarized in the table below.

Table 4-23 Issues and countermeasures for each agricultural infrastructure

VC segment	Agri-infra		
Production	Irrigation	Although it has great potential, development progress is slow due to a lack of funding. The existing facilities are extremely old and have deteriorated in functionality. Many WUAs are not fully functional.	There are policy goals. Development and rehabilitation are progressing, including external support (TRIMING, SPIN). A model for strengthening WUA was formed within TRIMING, and FMWRS is planning to disseminate.
Distribution	Rural road	Road density is low and rural residents have poor access to the road network. Approximately 90% of rural roads are in poor condition, and rural road development, maintenance systems, and project budgets are insufficient.	There are policy goals. Development and rehabilitation are progressing, including external support (RAMP I, RAMP II, RAAMP).
	Market in production area	Although there are many production markets in rural areas, they lack toilets, water supply, drainage, waste treatment, storage, parking and cargo handling spaces, banks, and mobile networks.	The policy is to strengthen VC linkage. Within RAAMP, agricultural distribution centers are being developed, and infrastructure improvements are also planned. Market functions are also planned for SAPZ.
Post-harvest	Storage	Approximately half of national silos require rehabilitation. Public reserve has high operating costs and limited use. States and private facilities are in short supply due to lack of funding.	There are policy goals. Half of the national silos are operated by private companies on a concession basis. Large companies are also working to strengthen their facilities. Storage facilities are also planned for SAPZ.
	Processing	Many small and medium-sized processors operate businesses, but facilities, technology, and management are inefficient and access to finance is difficult.	The policy is to strengthen VC linkage. Technical support for businesses and improvement of financial access are required. Processing functions are also planned for SAPZ.

Based on the above issues and countermeasures, priority project proposals in the agricultural infrastructure field, which are positioned at each stage of the value chain, were considered. The criteria for the judgment are the above-mentioned food security perspective (improvement of agricultural productivity, improvement of post-harvest loss), importance from a policy perspective, importance as a public investment, etc., and the positioning of each agricultural infrastructure development project is considered. The results of the consideration are shown in the table below, and each aspect of agricultural infrastructure was considered important and was positioned as a priority project.

Table 4-24 Consideration of priority project proposals

VC segment	Agri-infra	View point of food security		Importance in polity	Importance as public investment	Positioning of improvement
		Productivity increase	Post-harvest loss decrease			
Production	Irrigation	It has a large impact on improving productivity, and is expected to increase production volume and improve farmers' income.	We can contribute by developing distribution and post-harvest processing facilities around irrigation facilities.	It is important that the water resources section of the NDP sets a target value for the irrigation development area.	Irrigation facility development for small-scale farmers has a highly public nature and is highly important as a public investment.	This project is positioned as a priority project due to the importance of agricultural productivity, policy, and public investment.
	Rural road	Contributes to improved productivity by revitalizing the flow of people and goods	Improvements can be expected from improved access to purchasing companies and general transportation, and a reduction in cargo damage.	It is important that the NDP's rural development section sets targets for the length of rural roads.	There is no private sector responsible for road maintenance, and it is highly important as a public investment.	This project is positioned as a priority project due to the importance of improving access, policy, and public investment.
Post-harvest	Market in production area	Contribute to productivity improvement by gathering and trading people and goods	Improvement is expected due to increased trade activity, increased logistics volume, etc.	The agriculture section of the NDP calls for strengthening market linkages.	Infrastructure development is the role of state and local governments, and is highly important as a public investment.	This project is positioned as a priority project due to the importance of active trade, policy, and public investment.
	Storage	Contributes to improved productivity by securing a destination for products	Post-harvest loss can be reduced by shifting the shipping time	The agriculture section of the NDP sets targets for improving public stockpiling and reducing post-harvest losses.	Public investment to expand storage capacity is important. Financial support is desired for the private sector	This project is positioned as a priority project due to the importance of post-harvest loss improvement, policy, and public investment.
	Processing	Contributing to productivity improvement by securing sales channels for products	Post-harvest loss can be reduced by extending the quality retention period.	The agriculture section of the NDP calls for improved processing and added value.	Due to private sector support, financial support is preferred over public investment for facility development.	This project is positioned as a priority project due to its added value and policy importance.

Next, the agricultural infrastructure for a nearest project loan was selected from among the priority projects. As discussed in "4.2 Current status and challenges of agricultural infrastructure contributing to food security," it was determined that the development of irrigation facilities would be the most effective from the perspective of food security. Furthermore, as part of the framework of this study, it is assumed that the nearest agricultural infrastructure project loan will contribute to the development of production infrastructure, particularly with the aim of improving the productivity of small-scale farmers in rural areas. As shown in the table below, among the various types of agricultural infrastructure, the one that contributes most to improving the productivity of small-scale farmers is irrigation facilities, where the VC stage is at the production stage and the direct beneficiaries are small-scale farmers. Based on the above, irrigation facility development will be targeted for the nearest project loan.

Table 4-25 Agricultural infrastructure in the value chain

VC stage	Agricultural infrastructure	Direct beneficiaries from the improvement of the agricultural infrastructure
Production	Irrigation facility	Small-scale farmers
Distribution	Rural road, Production market	Small-scale farmers, Small and medium-sized businesses
Post-harvest Processing	Storage facility, Processing facility	Small and medium-sized businesses

Source : JICA Study Team

Next, the project menu of support measures was considered for agricultural infrastructures, which had been analyzed separately up to this point, including combinations, software aspects, schemes, etc. The study results are shown in the figure below.

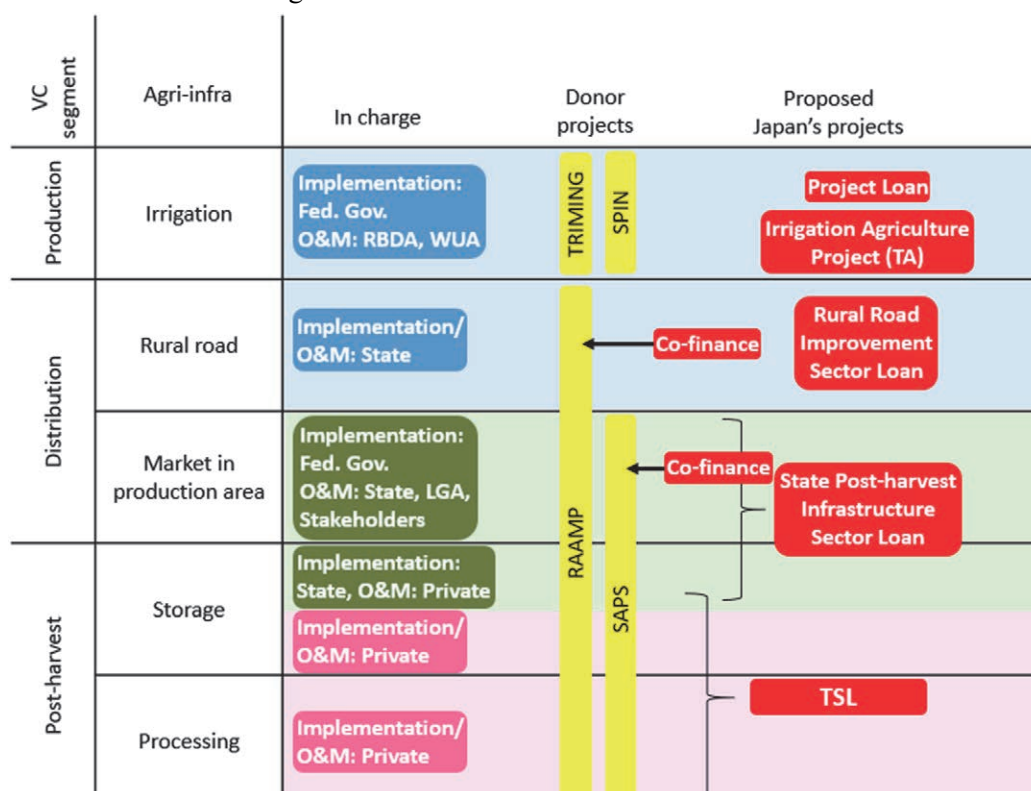


Figure 4-14 Project proposal for agricultural infrastructure

Starting from the left, VC classification and agricultural infrastructure are shown. The “in charge” category indicates the project implementer and operation/maintenance manager of each facility. Blue indicates projects undertaken by the government and producers, pink indicates projects undertaken by the private sector, and green indicates a mix of the two. To the right, the areas covered by other donors' projects in the VC stage are shown in yellow, and on the far right, projects for which Japan's support is expected are shown in red. Looking at it from above, for irrigation facilities, a project loan and a technical project to promote irrigated agriculture are proposed to be implemented in parallel. For rural roads, sector loans or co-financing to RAAMP are proposed for development, and state agricultural infrastructure sector loans or co-financing to SAPZ are proposed for development of local markets and state government storage facilities. For the private portion of storage and processing facilities operated by the private sector, TSL is expected to provide financial access to support enterprises.

The following section provides an overview of the priority projects. The contents of the TSL have already been explained in the previous chapter, and the details of the nearest loan project will be explained in "4.5 Proposal of the Nearest Loan Project."

4.4.2 Proposal of priority projects

A summary of each priority project proposal is shown below.

(1) Irrigated agriculture promotion project

Item	Contents
Name	Irrigation agriculture promotion project
Scheme	Technical Cooperation
Duration	5 years
Implementing agency	FMWRS, RBDA
Project overview	Since many large-scale public irrigation facilities were constructed in the 1970s, they have become increasingly obsolete, and their functionality has deteriorated due to lack of ownership from beneficiary communities, lack of maintenance, deterioration, and vandalism. Furthermore, farmers' opinions are not reflected in project plans, and projects are implemented top-down, resulting in a decline in water use and delays in water usage fee payments. In response to this, participatory water management has been adopted, and a model for developing water user associations (WUA) has been formed in the WB TRIMING from 2014 to 2024, and FMWRS plans to expand it nationwide. On the other hand, in order for farmers to take ownership of the maintenance and management of irrigation systems, they need to experience the benefits of irrigated agriculture. Therefore, in order to increase the income of farmers in irrigated areas, the aim is to improve agricultural productivity and build a value chain for agricultural products. On the policy side, the NDP (2021-2025) includes a national irrigation development program in the water resources section, which calls for a total of 500,000 hectares of irrigation development by 2030. In addition, one of the cross-cutting intervention measures in NATIP is the sustainable use of land and water resources, and improvement of irrigation services for farmers is mentioned.
Project purpose	In order to establish irrigation agriculture, improvement of the productivity of farmers in irrigation areas is aimed by the establishment of The operation and maintenance of irrigation systems through the development of WUA and capacity building of FMWRS and RBDA.
Activity overview	Output 1: Improve agricultural productivity by introducing irrigated agriculture 1.1 Investigate the actual state of farming in irrigation areas 1.2 Forming a farming system that takes advantage of the advantages of irrigated agriculture Note: In addition to improving productivity through the introduction of irrigation, it is expected that productivity will further improve if improved seeds, fertilizers,

	pesticides, agricultural machinery, etc. are effectively introduced, but conditions may vary depending on weather, soil, regional characteristics, etc. Therefore, it is necessary to establish an advantageous farming system for each crop and region. 1.3 Disseminate a farming system that takes advantage of the advantages of irrigated agriculture to farmers in the area 1.4 Supporting the establishment of value chains for irrigation area products 1.5 Quantify the income improvement of district farmers through the introduction of appropriate irrigation agriculture and promote farmers' understanding Output 2: WUA properly operates and maintains irrigation facilities 2.1 Encourage WUA members to understand WUA roles and responsibilities 2.2 Disseminate the WUA rules and build a WUA federation system that will supervise the entire tertiary canal level and secondary canal level. 2.3 Clarify the scope of responsibility of WUA at each level (maintenance, water distribution management, collection of water fees, etc.) and encourage implementation 2.4 Support the maintenance of WUA structures such as regular meetings of WUA at each level, general meetings of WUA federation, and election of board members. Outcome 3: Strengthen the capacity of FMWRS and RBDA 3.1 FMWRS investigates the operation, maintenance, and agricultural extension status of irrigation areas nationwide 3.2 FMWRS formulates a dissemination plan for participatory irrigation systems including agricultural support 3.3 Based on the dissemination plan, FMWRS aims to strengthen the capacity of RBDAs nationwide
Estimated project cost	Experts in irrigated agricultural extension, participatory water management, farming, etc. 18 person-months/year, total 90 person-months Activity cost: 2 million yen per month, total 120 million yen
Target area	Outputs 1 and 2 are to be achieved in about three states including the project loan implementation area, and capacity building is to be carried out nationwide.
Beneficiaries	FMWRS, RBDA, WUA members, irrigation area farmers

(2) Rural road improvement project

It is based on the content of RAAMP. It is possible to co-finance RAAMP, but since the demand for rural road development is enormous, it is also possible to divide areas and districts with RAAMP. In addition to rural road development, support for agricultural distribution centers is also appropriate.

Item	Contents
Name	Rural roads improvement project
Scheme	Sector loan or Co-finance
Duration	5 years
Implementing agency	State government
Project overview	In rural areas, road networks are lacking or in poor condition, which not only increases the cost of distributing agricultural products, which is the main industry in rural areas, but also narrows the range of activities of local residents. In addition to agriculture, it is also a hindrance to education, medical care, and business, and if improvements were made, it would have a large impact on local residents. Road density in Nigeria is approximately 22 km/100 km². This is at a low level, less than one-sixth of India's road density of 142 km/100 km², which has a slightly lower gross national income per capita than Nigeria. (Nigeria; US\$ 2,100; India; US\$ 1,880). The RAI (Rural Access Index, percentage of people who have a road that is always passable within 2 km walking distance) is 25.5%, meaning that 3/4 of rural residents have poor access to the road network. Additionally, 87% of rural roads are said to be in poor condition, and improvements are required. State and rural roads are essentially under the jurisdiction of state governments, but many states do not have the structure or budget to develop, maintain, and manage rural roads.

	On the policy side, in the rural development section of the NDP (2021-2025), infrastructure development in rural areas, including roads, is positioned as important. The KPI in this section is to increase the length of rural roads by 20% by 2025. In addition, infrastructure development in rural areas is listed as one of the cross-cutting intervention measures in NATIP, and rural road development is mentioned along with irrigation, etc.
Project purpose	Restore and maintain key rural transport modes in a sustainable manner, improving transport conditions and providing sustainable access for rural people.
Activity overview	Component A: Improving rural access and market infrastructure Subcomponent A.1 (a) Upgrading rural roads (b) Cross drainage works (c) Improvement of agricultural distribution center Subcomponent A.2: Design, procurement and consultancy services for Subcomponent A.1 Component B: Sector reform, asset management and agricultural logistics strengthening Subcomponent B.1 (a) Maintenance/Rehabilitation (b) Spot improvement (c) Daily maintenance Subcomponent B.2: Support for improving agricultural logistics. Implementation of post-harvest agricultural logistics research recommendations at field/cooperative level Subcomponent B.3: Consultant investigation and supervision for maintenance and spot improvement Component C: Organizational development, project management and risk avoidance
Estimated project cost	RAAMP targets 13 states nationwide and costs a total of \$575 million, including the burden on the Nigerian side (\$65 million), or approximately \$44 million per state. A Japanese sector loan targeting two states is expected to cost around \$88 million.
Target area	RAAMP covers 13 states: Sokoto, Kebbi, Katsina, Kano, Bauchi, Plateau, Kwara, Kogi, Oyo, Ogun, Ondo, Abia, and Akwa Ibom. In order to increase the synergistic effect, support from the Japanese side is expected to be provided to states targeted for project loans and SHEP support.
Beneficiaries	Rural residents, farmers, distributors, and state government officials

(3) State post-harvest infrastructure development project

This project is based on the content of SAPZ. Co-financing to SAPZ is considered, but it is also possible to separate regions, districts, and roles with SAPZ.

Item	Contents
Name	State post-harvest infrastructure development project
Scheme	Sector loan or Co-finance
Duration	5 years
Implementing agency	State government
Project overview	Nigeria has significant agricultural development potential but is constrained by low crop yields, high post-harvest losses (30%-50%), low value addition, and severe lack of infrastructure (particularly energy and transport). These hinder private sector investments to promote agricultural industrialization. As a result, locally produced food becomes less competitive and annual food import bills rise, contributing to high levels of poverty, unemployment and low levels of private investment in the agricultural industry. The unemployment rate in the fourth quarter of 2020 was high at 33.3% (22.2 million people) and is steadily increasing. The SAPZ program is aligned with NATIP 2021-2024 and National Livestock Transformation Plan (NLTP) 2019-2028 and will support the economic and social development of the Federal Government of Nigeria (FGN) and participating states. It will contribute to develop rural infrastructure, improve access to agricultural markets, increase agricultural productivity, adopt agricultural technologies, climate-smart agricultural production and processing, and increase

	value addition and agro-processing. It will also contribute to skills acquisition and job creation for all actors in the value chain, including smallholder farmers, women, and youth.
Project purpose	The goal is to increase rural household incomes, promote job creation for rural farming communities, especially youth and women, and strengthen food and nutrition security.
Activity overview	Component 1: Infrastructure development and management of AIHs (Agro-Industrial Hubs) 1.1 Processing infrastructure development The AIH (1 facility per state according to Program Appraisal Report; Special Agro-industrial Processing Zones Program – Phase I) will be built, including agricultural product accumulation/processing plants by size, slaughterhouses, warehouses, markets, agricultural equipment stores, clinics, gas stations, banks, management offices, accommodation facilities, etc., in addition to roads, water and sewage systems, energy and fiber optics, and will be prepared for private companies to acquire land and operate processing facilities. 1.2 Management and operation of AIH This includes implementation of environmental and social management plans, facility operations management, procurement management support, gender needs assessment services, etc. Component 2: Building of ATC (Agricultural Transformation Center) and AC (Aggregation Center) 2.1 Improving agricultural production and productivity near agricultural industrial clusters To increase the supply of raw materials near AIH, it will build local infrastructure, Agricultural Transformation Centers (ATCs, including agricultural processing plants, warehouses, markets, clinics, banks, administrative offices, etc., as well as roads, water, sewage, and power systems) and Collection Centers (ACs) to support field-level productivity. Feeder roads will improve access to production zones, AC and ATC. 2.2 Skills development for job creation Capacity building for MSMEs, youth and women to create jobs. Component 3: Policy and organizational development To promote SAPZ, promote private investment and address inefficiencies in agricultural value chains it will put in place targeted policies, laws, rules and regulations. Component 4: Program coordination and management Support the establishment of a task force within FMARD and an implementation unit at the state level. This includes training for related parties and various necessary surveys.
Estimated project cost	SAPZ Phase 1 targets eight states across the country and costs a total of \$538 million, including the burden on the Nigerian side (\$18 million), with an average cost of approximately \$67 million per state. If a Japanese sector loan targets one state, it is estimated to be around \$67 million.
Target area	SAPZ Phase 1 is supporting eight states: Ogun, Oyo, Kano, FCT, Kaduna, Kwara, Cross River, and Imo. Support from Japan is expected to be provided to states targeted for project loans and SHEP support, in order to generate synergistic effects.
Beneficiaries	Farmers, processors, distributors, and state officials

4.5 Proposal of the Nearest Loan Project

4.5.1 Selection of states and projects for consideration of project loan

As described in “4.4 Analysis of current situation in agricultural infrastructure and proposal of priority projects,” the agricultural infrastructure targeted for a project loan is irrigation facilities. (including field maintenance, irrigation canals, farm roads, etc. that are developed as an integrated project.)

FMWRS, which develops national irrigation facilities, announced the National Irrigation Development Program in 2016, aiming to develop 500,000 hectares of irrigation by 2030. To achieve this goal, a list of 33 priority projects has been created, as confirmed in "2.2.5 Agricultural Infrastructure." It is appropriate to select projects from this list for the nearest loan project, and FMWRS agrees on this point. The various projects on the list include rehabilitation, new development, with or without F/S. Since the maturity of planning is important for prompt implementation of a project loan, projects for which F/S has already been completed were considered.

On the other hand, in order to implement the project, it will be necessary for Japanese personnel to visit the site. Amidst the severe security situation in Nigeria, as of October 2023, 18 of the 37 states in the country are at risk level 2 according to the Ministry of Foreign Affairs of Japan, and 7 of these states can be visited according to JICA's safety standards (○ in the table on the right). Among them, there are a total of 6 IPs in 4 states (◎ in the table on the right) for which F/S has been conducted by FMWRS, and these were selected as projects to be considered for irrigation facility development projects using a project loan. The locations of these states and IPs are shown in the map below.

Table 4-26 States eligible for project loan consideration

Zone	No	State	JICA's safety measure, as of Oct. 2023	No. of F/S of FMWRS	States for consideration
NE	1	Taraba	○	2	◎
NC	2	Benue	×	0	
NC	3	FCT	○	0	
NC	4	Kwara	○	1	◎
NC	5	Nasarawa	○	2	◎
NC	6	Plateau	×	1	
SE	7	Abia	×	0	
SE	8	Ebonyi	×	0	
SE	9	Enugu	×	0	
SS	10	Akwa Ibom	○	0	
SS	11	C/Rivers	×	0	
SS	12	Edo	×	0	
SW	13	Ekiti	×	0	
SW	14	Lagos	○	0	
SW	15	Ogun	×	1	
SW	16	Ondo	×	0	
SW	17	Osun	×	0	
SW	18	Oyo	○	1	◎
		Total		8	

Nigeria Map

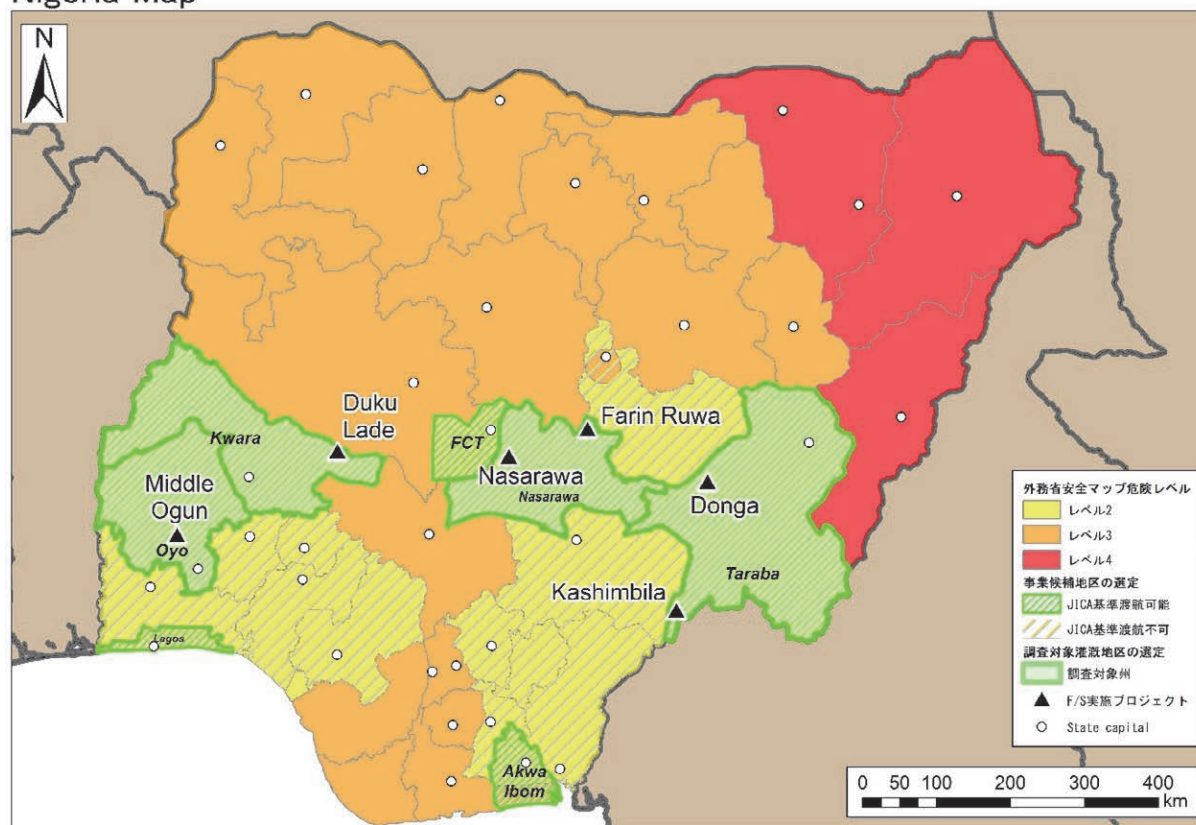


Figure 4-15 Location map of target states and irrigation projects

4.5.2 Confirmation of water resource situation in the area of consideration

Since the status of water resources (precipitation) is an important factor in irrigation development, the status of water resources in these four states was confirmed as follows. All four states have relatively abundant annual rainfall of around 1,050 mm to 1,350 mm, and total water demand is low both now and in the future (2030). Based on these facts, it is thought that there are no constraints in terms of water resources in the four states and 6 IPs.

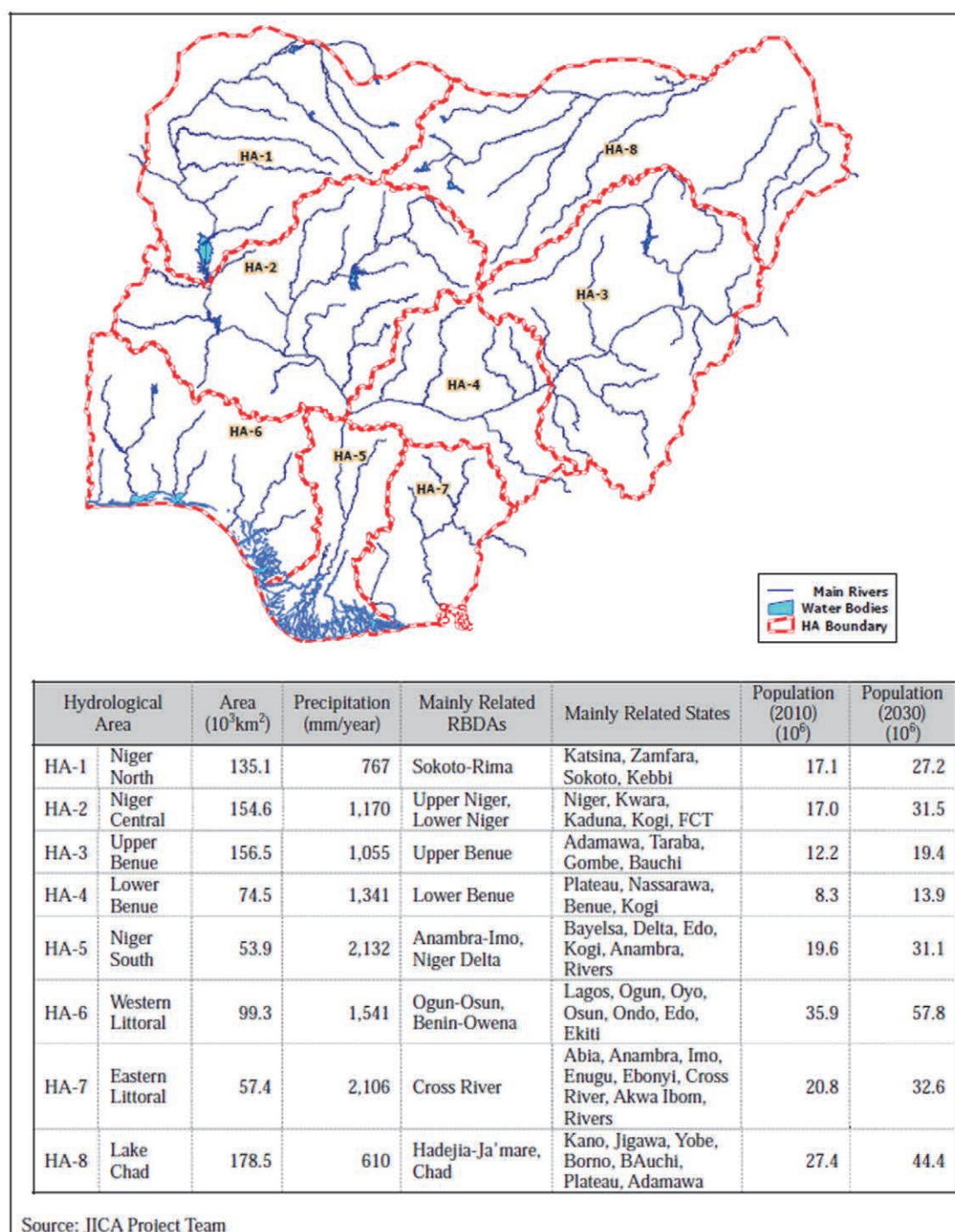


Figure 4-16 Hydrological regions and rainfall in Nigeria

Source: The Project for Review and Update of Nigeria National Water Resources Master Plan

Nigeria's water resource potential is shown in the table below, where water use rate is defined as the ratio of total water demand to total water resource potential. The water use rate was only 1.6% in 2010, but is expected to rise to 4.4% in 2030. The water use rate of HA-8 in the northeast was 14% in 2010, much higher than other HAs, and is expected to reach around 30% in 2030. Other HAs are below 10%. The total water demand for the entire country in 2030 is still expected to be much smaller than the total water resource potential.

Table 4-27 Nigeria's water resource potential

			HA-1	HA-2	HA-3	HA-4	HA-5	HA-6	HA-7	HA-8	Total
Total Water Resources Potential											
Including inflow from outside Nigeria	(BCM/year)	(1)	37.4	40.9	60.2	47.9	50.7	43.7	84.0	10.3	375.1
Only Internal Generation	(BCM/year)	(2)	10.7	40.3	37.9	32.8	50.7	43.6	60.3	10.3	286.6
Groundwater Resources Potential	(BCM/year)	(3)	5.0	20.5	19.3	18.6	31.9	23.4	32.8	4.3	155.8
Total Water Demand											
Existing (2010)	(BCM/year)	(4)	0.79	0.59	0.35	0.25	0.50	1.54	0.46	1.46	5.93
	(%)	(4)/(1)	2.1	1.5	0.6	0.5	1.0	3.5	0.5	14.2	1.6
	(%)	(4)/(2)	7.4	1.5	0.9	0.8	1.0	3.5	0.8	14.2	2.1
Future (2030)	(BCM/year)	(5)	1.63	1.87	2.27	1.15	1.66	3.54	1.36	3.11	16.58
	(%)	(5)/(1)	4.3	4.6	3.8	2.4	3.3	8.1	1.6	30.2	4.4
	(%)	(5)/(2)	15.2	4.6	6.0	3.5	3.3	8.1	2.3	30.2	5.8

Source: The Project for Review and Update of Nigeria National Water Resources Master Plan

4.5.3 Utilizing lessons learned from similar projects

In this section, lessons learned from past similar projects other than TRIMING are summarized and utilized for subsequent consideration. There has been a gap in Japanese assistance in Nigeria's agricultural sector since the 1980s and early 1990s, when Japan provided a loan project of irrigation development and a technical cooperation project of irrigated rice cultivation in the Lower Anambra. Since the "Rice Post-Harvest Processing and Marketing Pilot Project in Nasarawa and Niger States" started in 2011, technical cooperation have been carried out including nutrition, SHEP, Africa Field Innovation Center for Agricultural Technology (AFICAT), and advisors in the agricultural sector. A grant aid and technical cooperation in the field of rice cultivation are also planned. However, the only yen loan project in the agricultural sector that will be proposed in this study is an irrigation project that was carried out more than 30 years ago, and the irrigated area is currently almost non-functional¹⁷⁵. Therefore, this section examines irrigation projects in the Lower Anambra and other similar projects and extracts lessons.

(1) Examination of implemented projects in Lower Anambra

To date, Japan's support for irrigation development in Nigeria has included one development study (1976-1977), one loan project (loan agreement concluded in 1981, construction completed in 1989) and one technical cooperation project (1989-1993), and all targeted the Lower Anambra irrigation area.

¹⁷⁵ Project Research: Impact Study of Japan's Irrigated Rice Crop Cooperation in Sub-Saharan Africa (JICA, 2008)

These are examined from the "Project Research: Impact Study of Japan's Irrigated Rice Cultivation Cooperation in Sub-Saharan Africa" (JICA, 2008).

1) Lower Anambra Irrigation Project (financial cooperation: loan agreement signed in 1981, completed in 1989)

The Lower Anambra Irrigation Project constructed irrigation facilities in the Lower Anambra area, which was ranked as the highest priority area in the Anambra Basin Comprehensive Development Plan under the Fourth National Development Plan (1981-1985). This aimed to increase production by making it possible to grow rice in two seasons. The plan was to take water from the Anambra River (a tributary of the Niger River) to irrigate 5,000 ha of new rice fields.

The entire foreign currency portion of this project, excluding the rice milling facility, was covered by the Japanese loan, which was used for the construction of irrigation-related facilities, farming guidance, equipment procurement, and consulting services. The project plan and achievement as of May 1994 are shown in the table below.

Table 4-28 Comparison of plans and actual results

Item	Plan	Achievement (as of May 1994)
Scope of the Project		
Irrigable area	5,000ha	3,850ha
Pumping station Number of bases x capacity	5×120=/min/unit	Same as left
Irrigation canal	513.1km	372.8km
Drainage	348km	225.2km
Road	598.3km	262.6km
Rice milling equipment (number of rice milling machines x capacity)	5×2t/hour	1×3.3t/hour
Building	Construction of headquarters/administrative offices, etc.	Separately implemented by the implementing agency
Agricultural machines	183 tractors 110 rotavators, etc.	136 tractors 102 rotavators, etc.
O&M equipment	no plan	Procurement
Construction of workshop/training facilities	no plan	Construction
Consulting Services	Construction supervision/farming guidance	Same as left
Construction period	1981.10~1986.6 (57 months)	1981.11~1990.10 (108 months)
Project cost	Foreign currency portion: 21,360 million yen (Overseas Economic Cooperation) Fund: 16,900 million yen Local currency: 37,398 thousand naira Total: 36,059 million yen	Foreign currency portion: 16,439 million yen (Overseas Economic Cooperation) Fund: 16,439 million yen Local currency: 31,398 thousand naira Total: 21,736 million yen

【Comprehensive evaluation (evaluation report date May 1994)】

i) Scope of the project

Primarily due to land acquisition issues, the irrigated area had to be reduced from his planned 5,000 ha to 3,850 ha. Along with this, the total length of irrigation canals, drainage canals, and roads was also shortened. Although the reduction in the target area due to land acquisition issues reduces the benefits of the project, it is judged to be an unavoidable situation that could not have been foreseen at the time of planning, as it was based on a change in the partner country's government policy.

ii) Construction period

The construction period was a 52-month delay compared to the original plan, and as a result, the Overseas Economic Cooperation Fund has extended the loan disbursement deadline by two years. However, this delay was not due to delays in the irrigation facility construction itself, but was mainly caused by the construction of rice milling facilities, training facilities, etc., and there does not seem to have been any particular problem with the initial construction schedule.

iii) Project costs

The actual disbursement of foreign currency and local currency were ¥16,439 million (down 23% vs. plan) and N 31,398,000 (down 16% vs. plan, 53% in real value), resulting in a cost underrun. The reason for this is basically a reduction in the scope of irrigation projects, but there is also an aspect in which the scale had to be reduced due to the inability to allocate the local currency budget.

iv) Project effectiveness

As a result of this project's double cropping of irrigated paddy fields, annual rice production increased from just over 1,000 tons before the project to over 20,000 tons in 1992. The project has been able to transfer rice cultivation techniques and improve the income of surrounding farmers, and it has achieved a certain degree of effectiveness.

2) Lower Anambra Irrigated Rice Cultivation Project (Technical Cooperation Project: 1989-1993)

i) Background of cooperation

In order to increase agricultural productivity through double cropping of rice, Nigeria used Japanese loan to construct irrigation facilities and farms, procure agricultural equipment, etc. in the Lower Anambra of Anambra State, and civil engineering work was completed in 1987. As a follow-up to the Japanese loan project, Japan provided Nigeria with technical cooperation, including the establishment of a rice cultivation extension training center through grant aid, as well as water management, farming guidance, and equipment provision by Japanese experts. Nigeria has little experience in irrigated rice cultivation, and in order to establish irrigated rice cultivation, there was an urgent need to train technicians, and efforts were also needed to select appropriate varieties and disseminate them.

ii) Contents and results of cooperation

In the fields of; (1) Rice cultivation, (2) water management and facility management, (3) agricultural machinery (operation), (4) agricultural machinery (maintenance), and (5) extension and training, were implemented.

iii) Evaluation (outcomes, technical/social/economic challenges, and impact)

Although the project's terminal evaluation study team was scheduled to be dispatched in July 1993, the political situation in Nigeria deteriorated following the presidential election in June. All experts returned home to evacuate, and the dispatch was cancelled. Since the project was subsequently terminated without any improvement in the security situation, it was not possible to conduct a comprehensive evaluation of the project's activities in joint with the Nigerian evaluation team.

Due to security issues, Japanese officials were unable to visit the project site for a long time, and were unable to grasp the status of the project after the cooperation. In reviewing the cooperation in this impact study, the study team commissioned a local consultant in Nigeria in March 2008 to investigate the current situation in the Lower Anambra Irrigation Project. Because the field survey was conducted over two days during the dry season, the information collection on the state of agriculture in the vast 3,850 ha irrigation project area was limited. According to a field survey, although the pumping station was in relatively good condition, the overall irrigation system had not been functioning since the end of the technical cooperation project in 1993, and as a result, the activities of the WUA had ceased. Agricultural extension services are also reportedly not currently available.

iv) Consideration of cooperation in Lower Anambra

It can be described as an ambitious project aimed at establishing large-scale irrigation and modern farming in areas where tubers and roots were the staple food and extensive rain-fed rice cultivation was practiced in some areas.

A considerable number of tractors were introduced in the loan project in conjunction with irrigation improvements, but at the start of the technical cooperation project, most of them had not been properly maintained and were not in operational condition. During the technical cooperation period, JICA experts made efforts to maintain a minimum number of machines in operational condition, but it is assumed that this could no longer be maintained with the end of the cooperation.

The aforementioned local consultant report suggests that the irrigation system also stopped functioning almost at the same time as the technical cooperation project ended. Although the project counterpart has learned the basic maintenance and management techniques for irrigation systems, it seems that it was difficult to properly maintain and manage the large pumps used in this project at the local technical level. This point should be taken into consideration when implementing irrigation agricultural cooperation in the Sub-Saharan African region in the future.

Furthermore, due to the worsening security situation, the technical cooperation project had to end its cooperation after five years. Due to the nature of the work, it was not possible to fully establish the results of the organization of agricultural cooperatives and WUAs, which take a long time to produce results. As a result, a challenge remained in that a system to support the technology was not built in

terms of organization and systems. If the security situation had been stable, it would seem appropriate to conclude that the project required continued cooperation.

The above is an overview and evaluation of both projects, but based on the results of this information collection survey, the following lessons can be raised along with possible countermeasures.

- 1) The water in this area is pumped up using large pumps, which was difficult to maintain and manage properly with the local level of technology, but advanced technology was suddenly introduced.

When introducing large-scale pumps, etc., which require advanced technology and specialized contractors, it is necessary to investigate and consider whether maintenance and repair can be carried out locally, and how to bear costs such as electricity bills, and if it is difficult, it is necessary to consider using medium-sized pumps or gravity irrigation by diversion canals.

- 2) Due to the implementation of the technical cooperation project after a loan project, a second rice crop was introduced and productivity increased dramatically, but the cooperation had to be interrupted due to the deterioration of public security, so the project was not continued.

Although sufficient information on the security situation is collected in advance and safe areas are selected, it is necessary to prepare remote guidance via the Web and working in a third country in the event of a deterioration in security. In addition, since many countries have already introduced remote guidance via the web and training in third countries, it is necessary to use these methods.

- 3) Although efforts were made to organize WUAs to carry out maintenance and management of facilities and farm management, supports were interrupted just two years after their formation, and they were not really established. Furthermore, there was no institutional support at that time.

Regarding the organization of water users' associations and the practice of operation and maintenance, it is necessary to clarify the roles with the government and consider methods of support from the government, and to transfer operation and maintenance to farmer organizations through gradual development. In this case, creating and disseminating advanced examples is also considered to be a meaningful method. In Nigeria, efforts by the WB have already clarified the division of roles and put into practice water user associations in developed areas, and future efforts will need to take this into account.

In the future, when developing irrigation facilities, it will be necessary to take these lessons into consideration.

According to a recent survey¹⁷⁶, the irrigation facilities in the Lower Anambra Irrigation Project are not functioning, and most of the farmers in the district cultivate rice using rain water during the rainy season without access to irrigation water. Interviews with FMWRS also confirmed that as of January 2024, irrigation is not functioning in the area. Meanwhile, the AfDB-supported Agricultural Transformation Agenda Support Program Phase I plans to rehabilitate pumping stations and canals in the area at a cost of N1.8 billion.¹⁷⁷

¹⁷⁶ Lower Anambra Irrigation Project's Provision of Farm Facilities to Farmers and Rice Production in Ayamelum Local Government Area, 2008-2018, IJSSHR, 2023

¹⁷⁷ <https://guardian.ng/news/afdb-n3b-lower-anambra-irrigation-project-receives-boost/>

(2) Lessons learned from other similar project

Regarding irrigation projects, considering the situation in Nigeria where many medium- and large-scale irrigation facilities constructed in the past have deteriorated in functionality, it is considered important to provide a variety of medium- to long-term support, such as increasing the income of beneficiaries and improving the O&M capabilities of the stakeholders, in addition to constructing facilities. In doing so, clarifying the division of roles among the parties involved and organizing beneficiaries will also be important elements. Conflict between farmers and pastoralists is also an issue in Nigeria that needs to be addressed.

Table 4-29 Evaluation perspectives and reference projects for utilizing lessons learned

Evaluation perspective	Evaluation points	Reference project (literature)
Considering medium- to long-term and diverse support	• The technical project in Lower Anambra provided technical guidance on farming to establish irrigated rice cultivation, but medium- to long-term support was not possible due to the worsening security situation. • In the cases of Tanzania and Kenya, various schemes were combined to provide long-term support for both improving facility functions and strengthening organizations. Such medium- to long-term and diverse support is required. • In addition, to achieve this, it is necessary to avoid security risks as much as possible in advance and build a system that can respond remotely.	Lower Anambra Irrigation Project (loan), Lower Anambra Irrigated Rice Cultivation Project (Technical Cooperation Project), FADAMA I – III (WB), Lower Moshi irrigation scheme (Tanzania), Mwea irrigation scheme (Kenya)
Maintenance and management of core facilities	• In Lower Anambra, AIRBDA was responsible for the maintenance and management of core facilities, but it is assumed that operation and maintenance of large pumps was difficult. • In the case of Kenya, as part of technical cooperation, the NIB (National Irrigation Board), which is the managing body, was trained in appropriate management methods, and efforts were made to ensure that they acquired the skills. In this way, it is necessary to improve the capacity of the main body responsible for maintenance and management.	Lower Anambra Irrigation Project (loan), Lower Anambra Irrigated Rice Cultivation Project (Technical Cooperation Project), Lower Moshi irrigation scheme (Tanzania), Mwea irrigation scheme (Kenya)
Clarification of role sharing among related parties	• Regarding irrigated agriculture, FMWRS, FMAFS, state departments, and RBDA are involved, but the division of roles is not clear and they are in competition. • It is necessary to make this a form of participatory water management, with an appropriate division of roles and structure, such as RBDA being responsible for the core facilities, water user associations for terminal canal, and state departments for land and dispute resolution.	A review of the evaluation of irrigation practice in Nigeria: Past, present and future prospects
Management of irrigation organizations	• In the traditional small-scale irrigation areas of Bida district in Niger State, the maintenance and management of facilities is carried out by the farmers themselves, which is largely influenced by the landowner system that has remained since the kingdom era. In Nigeria, traditional social norms remain in each region, so it is expected that sustainability will be improved by adhering to these norms in the management of irrigation associations.	Small-scale irrigation area near Bida, Niger State (Traditional Farmer-Managed Irrigation System in Central Nigeria), A review of the evaluation of irrigation practice in Nigeria: Past, present and future prospects
Preventing conflicts between parties	• In FADAMA I, wetlands and water sources used for nomadism were developed for agriculture, resulting in sporadic conflicts between nomads and farmers. For this reason, FADAMA II encouraged the participation of all	FADAMA II (WB)

Evaluation perspective	Evaluation points	Reference project (literature)
	stakeholders and paid attention to conflict prevention at the community level.	

4.5.4 Overview of the projects under consideration

The outline of the six projects to be considered is summarized in the table below.

Table 4-30 Overview of the irrigation area to be considered

Item	Nasarawa	Duku-Lade	Donga-Suntai	Kashimbila	Farin Ruwa	Middle Ogun
Year	Report: Sep. 2018 Study period: Jan. 2017-	Design report: Sep. 2022	F/S Report: Mar. 2018	Report: Dec. 2017	F/S&D/D Report: Feb. 2023	Report: Mar. 2022
Name	Nasarawa Irrigation Project	Duku-Lade Irrigation Project, Kwara State	Donga-Suntai Irrigation Scheme	Kashimbila Irrigation Project	Farin Ruwa Irrigation Project	Middle Ogun Irrigation Project
F/S implementer	Federal Ministry of Water Resources	Federal Ministry of Water Resources	Federal Ministry of Water Resources	Federal Ministry of Water Resources	Federal Ministry of Water Resources	Federal Ministry of Water Resources
Location (state, LGA)	Nasarawa State Karu, Kokona, Nasarawa, Doma LGA	Kwara State Pategi LGA	Tarabs State Gassol LGA	Tarabs State	Nasarawa State Wamba LGA	Oyo State Iseyin LGA
Irrigation Area	20,800ha (Total of 4 schemes)	1,200ha	32,712ha (Sansannni Benue Littorals) 5,000ha ?	Total 2,340ha Farm1: 1,000ha Farm2: 1,000ha Farm3: 340ha	Total 5,557ha Area 1: 853ha Area 2: 871ha Area 3: 848ha Area 4: 2,985ha	Total 920 ha, 2 plots (600, 320 ha)
Feature	New intake & new irrigation area	New dam & extension of irrigation area	New dam & new irrigation area	New pump intake, 2 control reservoirs (CR) & new irrigation area	New pump intake, 6 control reservoirs & new irrigation area	Review of original plan and improvement of present conditions
Major Facility	New intake & new irrigation area	Dam (H=25m, L=1,620m, reservoir of 42Mm ³ Extension of irrigation area	Dam (H=15m, L=1,842m reservoir 120Mm ³ New irrigation area	CR1: 140,000m ³ CR2: 60,000m ³ Pipeline, center pivot	New pump intake, 6 control reservoirs & new irrigation area	Rehabilitation of existing facilities, road development in the area
Project Cost	₦ 27,580.54 billion	₦ 12,625,711,858.87	N.A.	N.A.	N.A.	(Original plan (3,000ha), ₦ 882,046,792 & US\$40,335,770)
Economic Analysis	EIRR: 12.3%	B/C=1.79	N.A.	N.A.	(Analyzed but not indicated in the report)	N.A.
Planned Crops	Rice, sugarcane, beans, yam, cassava, wheat	Rainy season: rice Dry season: maize, sorghum, cowpea, tomato, onion, chili	Rice (paddy, upland)	Banana, cotton, beans, soybeans, maize, rice (paddy, upland)	Rice, wheat, sorghum, maize, sugarcane, beats, ground nuts, cotton, soybeans, tabaco, beans, tomato, potato, onion, cabbage, banana, citrus	Cassava, maize, yam, vegetables, plantain, pineapple, citrus
Note					SPIN (WB) candidate	

4.5.5 Selection of candidate IPs for the project loan

Based on the lessons shown in 4.5.3 Utilization of lessons from similar projects, the specific criteria for selection are: 1) Excluding areas where other organizations have already implemented or plan to implement the project, 2) Make use of Japan's strengths as much as possible, 3) There should be no major obstacles to implementation, and 4) The project must serve as a model for future development, etc..The above is summarized below.

1) Areas planned to implemented by other organizations

Since Farin Ruwa IP in Nasarawa State is considered as a candidate area for World Bank assistance, it will be excluded from the target.

2) Demonstration of Japan's strengths and effects

Priority will be given to areas where in addition to the effects of improving crop productivity through irrigation development, many small-scale farmers benefit from the project, including contributing to alleviating poverty among small-scale farmers and where it is expected that the technologies that Japan has built up to date (rice production and processing technologies, SHEP, etc.) will be utilized. Of the six IPs mentioned above, Middle Ogun district in Oyo State is excluded because it does not produce rice.

3) Obstacles to implementation

Areas where construction will require the relocation of many residents or areas where new large-scale farmland development will be required, rehabilitation areas where maintenance is not being carried out properly, and areas where there are concerns about ongoing operations such as project implementation and subsequent maintenance (pump fuel and electricity costs) are excluded.

Kashimbila IP in Taraba State is planning to irrigate water with a center pivot irrigation facility using water pumps, so this IP has been lowered in priority because pumps require dealing with electricity costs and power outages. In addition, Duku-Lade in Kwara State and Donga-Suntai in Taraba State are planned to have new large-scale dams, so consideration will be given to the situation such as resident relocation.

4) Modelability

The region or state will be selected taking into consideration the availability of water resources and future irrigable area, and the need to consider whether the region or state can continue to carry out irrigation development projects in the future.

5) Environmental impact assessment

Six IPs were evaluated from the perspective of environmental and social considerations and organized in the table below.

Table 4-31 Environmental and social considerations for the target irrigation area

Area	Nasarawa	Duku-Lade	Donga-Suntai	Kashimbila	Farin Ruwa	Middle Ogun
ESIA Completion	IEE level study completed for all 4 areas	ESIA completed	Scoping completed	not clear	ESIA completed	not clear
Application for ESIA report approval	Not submitted yet	Not submitted yet	Not submitted yet	Not submitted yet	It is assumed SPIN has submitted.	Not submitted yet
Vulnerable Areas	Not applicable	Close to Ramsar site “Lower Kaduna-Middle Niger Floodplain” and IBA Possibly affected	Kambari Game Reserve about 100km upstream Almost no impact.	Kashimbila Game Reserve about 20km upstream Almost no impact	About 75km from Ramsar site “Pandam and Wase Lakes” and Pandam Wildlife Park Almost no impact	Old Oyo National Park about 75km upstream Almost no impact
Project Outline	New development of water intake facilities and irrigation areas	Construction of a new dam and expansion of existing irrigation areas	Construction of new dams and new irrigation areas	New construction of a pumping station and reservoirs (two (2) locations) and new development of irrigation area	Six (6) reservoirs	Review the original development plan and improve rural and irrigation infrastructure.
Irrigated area 5,000ha or more Category I *)	20,800ha (total of 4 areas) Laminga 6,600ha Applicable	1,200ha Not applicable	32,712ha Applicable	Total 2,340ha Not applicable	5,557ha (total of 4 areas) Applicable	920ha (total 2 areas) Not applicable
Dam surface area over 200ha, Embankment height 15m or more Category I *)	No dam or reservoir Not applicable	Water surface area about 503ha Embankment height 25m Applicable	Water surface area Approximately 800 ha Embankment height 15m Applicable	Water surface area of the larger one of two reservoirs Approximately 2.6 ha. Not applicable	Total water surface area of 6 reservoirs Approximately 123ha Not applicable	No dam or reservoir Not applicable
Involuntary resettlement	Not occur	Not occur	A small amount of resident relocation will occur.	Not yet fixed	Not occur	Not expected
Category according to JICA guidelines	Category A	Category A	Category A	Category B	Category A	Category B

*Category I project listed in Nigeria's EIA Procedural Guidelines (approval based on a full-scale EIA study is required. Equivalent to Category A of JICA guidelines)

Based on the above considerations, it is judged that the Nasarawa IP has the highest priority as shown in the table below. Duku-Lade and Donga-Suntai have the same priority. Donga-Suntai is a new irrigation development area, while Duku-Lade is an expansion of an existing irrigation area, so farmers in the area have a deep understanding of irrigation agriculture. Therefore, it is determined that Duku-Lade has higher priority between the two.

Table 4-32 Priority of IPs

Area	Nasarawa	Duku-Lade	Donga-Suntai	Kashimbila	Farin Ruwa	Middle Ogun
Target of other doners	○ (F/S has been conducted, other doners have not conducted)	○ (F/S has been conducted, other doners have not conducted)	○ (F/S has been conducted, other doners have not conducted)	○ (F/S has been conducted, other doners have not conducted)	× (F/S has been conducted, World Bank (SPIN) implementation candidate area)	○ (F/S has been conducted, other doners have not conducted))
Strengths and effects	○ (Rice production area)	○ (Rice production area)	○ (Rice production area)	○ (Rice production area)	—	× (No rice production area)
Impediment	None (New irrigation area, water source is river)	Yes (medium) (New irrigation and expansion, with dam (503ha))	Yes (medium) (New irrigation area, with dam (submarged area of 800 ha or more))	Yes (large) (New irrigation area, water pump + regulation pond + pipeline)	—	—
Modelability	Yes (Abundant water resources, and there is a lot of area within the state that can be developed in the future)	Yes (Abundant water resources, and there is a lot of area within the state that can be developed in the future)	Yes (Abundant water resources, and there is a lot of area within the state that can be developed in the future)	Yes (Abundant water resources, and there is a lot of area within the state that can be developed in the future)	—	—
Environment and Social Impact Assessment	△ (Category A)	△ (Category A)	△ (Category A)	○ (Category B)	—	—
Priority	◎ (First priority)	◎ (Second priority)	◎ (Third priority)	△	×	×
Note: “—” are clearly excluded from priority rankings due to higher-level selection items.						

4.5.6 Contents of Project Loan

Based on the selection results in the previous section, the details of the irrigation projects (IPs) for Nasarawa and Duku-Lade are explained below, based on the F/S reports of both IPs.

(1) Nasarawa-Laminga IP

1) Introduction

The Nasarawa Irrigation Project is the general name for the development project of four irrigation schemes, namely Laminga, Doma, Garaku, and Usim schemes shown in the table below. Since only the Laminga scheme is listed in the FMWR project list, the overview of the Laminga scheme of the Nasarawa Irrigation Project is focused in this section.

Table 4-33 General information on Nasarawa IP

No	Schemes	No of Sectors	No of Farm Blocks	No of Farm Plot	Total Area (Ha)
1	Laminga in Karu / Nasarawa LGA	4 Nos	15 Nos	3,300	6,600
2	Doma in Doma LGA	1 No	13 Nos	3,300	6,600
3	Garaku in Kokona / Nasarawa / Doma LGAs	4 Nos	22 Nos	1,550	3,100
4	Ushim in Nasarawa LGA	3 Nos	10 Nos	2,250	4,500
	Total	12 Nos	60 Nos	10,400	20,800

Source: Consultancy Services for Feasibility Study and Design of Nasarawa Irrigation Project, Nasarawa State (Lot A2) Final Design Report

As shown in the table above, the project assumes the establishment of farm plots every 2.0 ha in all the schemes, and 3,300 farm plots in the Laminga scheme.

2) Background of the project

The study area as identified by the revised National Water Resources Master Plan (NWRMP 2013) is in Nasarawa State and drained by two tributaries of River Benue namely River Akinni and River Mada. However, the planned irrigation project will enable it to maximize the use of the abundant surface water resources and arable land in Nasarawa state.

Nasarawa State is known to be chief producer of main crops like yams, rice, guinea corn and millet, with yam providing some 45 percent of the cash income. The proposed irrigation project will allow farmers to have the opportunity for all-year planting of yam, millet, cassava, maize, vegetables and few others. Farmers will also use of tractors, mechanical equipment for planting and harvesting, and fertilizer to achieve high farm productions in Nasarawa State. Irrigation scheme will also allow for full scale livestock agriculture and will even stop migration of herdsmen or the need to rear the cows into farms. Livestock farming will allow for poultries, ranches for cows, goats, sheep, etc. and fish-pounds.

3) Purpose of the project

Irrigation development will provide;

1. Increase crop yields by increasing opportunities to introduce mechanization into cultivation
2. Reduce the effects of irregular weather changes
3. Effective and economical crop rotation
4. Use of fertilizers and agronomists
5. Support the procurement of funds necessary for management and the maintenance of large-scale

agriculture

6. Formation of effective farmer organizations through administrative efforts of FMWR and LBRBDA

7. Irrigation projects are managed privately and revenues are generated from (i) sales of irrigation water, livestock water, crop processing water, etc., (ii) land use fees, and (iii) fees and levies from farm markets and parks

4) Current condition of target area

Details of population based on 2006 National Population Census and land area in the affected four (4) LGAs, including the target LGA of Laminga scheme, are as follows:

Table 4-34 Details of affected four (4) LGAs

No	LGA	Land Area	Population	Remarks
1	Karu	2,640 km ²	205,477	originally built to house the capital's civil servants and lower income families, but had no running water or good sanitation system
2	Kokona	1,844 km ²	109,749	
3	Nasarawa	5,704 km ²	189,835	There is Federal Polytechnic in Nasarawa.
4	Doma	2,714 km ²	139,607	
Total		12,902km²	644,668	

The total population of Karu and Nasarawa LGAs where Laminga LGA is located is 395,312.

Nasarawa State has a high agricultural potential culminating in Greenwich savannah area in the middle-belt part of Nigeria. Agricultural practice is restricted primarily by limited and erratic rainfall. In the absence of irrigation, some subsistence agriculture is taking place and livestock such as goats are kept. Communal land ownership does result in over grazing, exacerbated by the absence of a camping program and fencing.

At present, there are few irrigation schemes of 0.5ha to 3ha in sizes in the State. Most of the irrigation schemes are privately owned and the main type of irrigation systems are furrow and basin. The irrigation schemes are operated with water pumped from river channels.

5) Water resource plan

River Mada will provide irrigation water for 14,200ha of farmland. There is no dam on River Mada yet, hence intake weirs are proposed for the three (3) schemes being supplied raw water from the river. (No details provided in the F/S report).

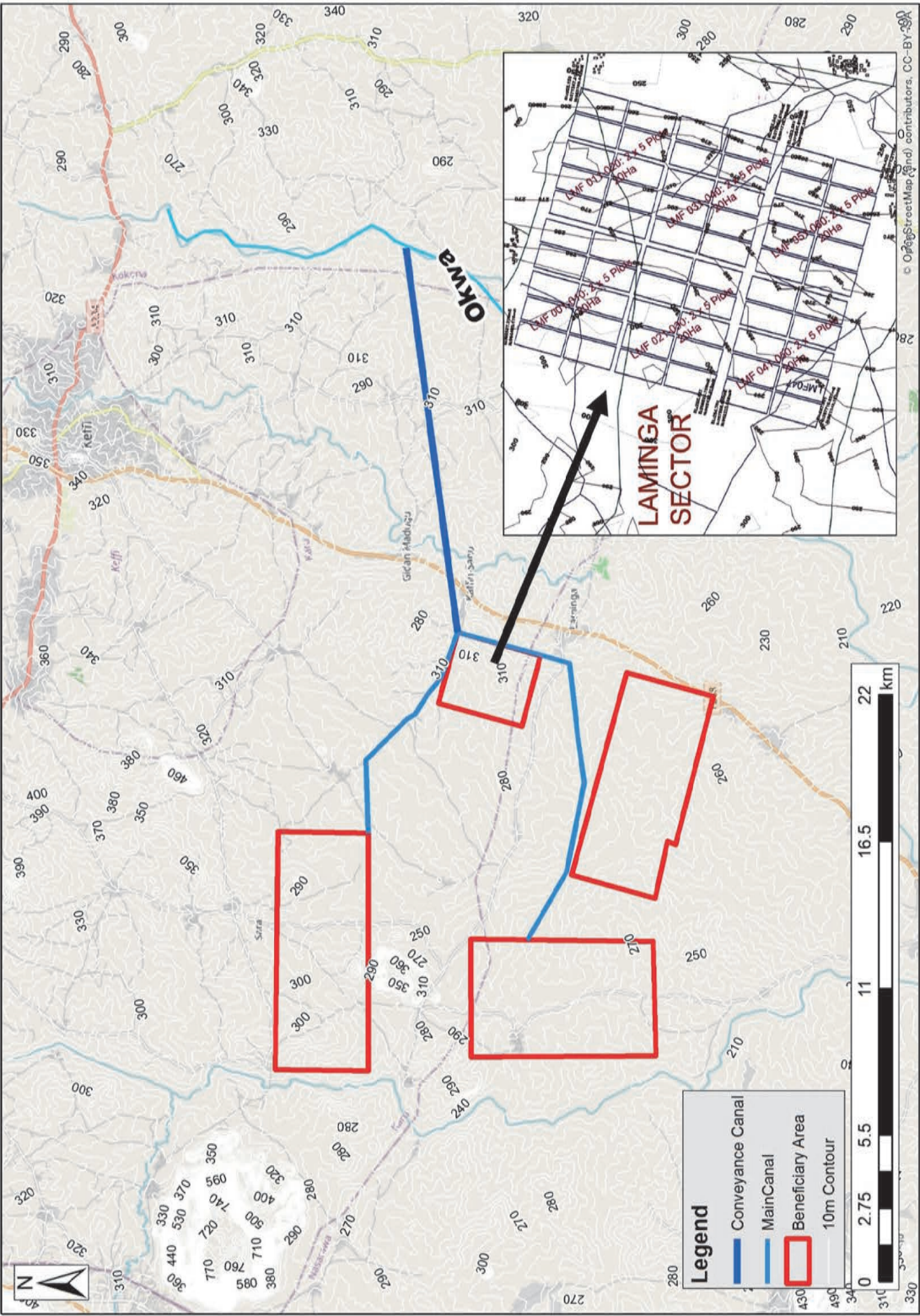


Figure 4-17 General Layout of Irrigation Schemes

Total water demand of irrigation schemes under Mada River is approximately 1.18m³/sec, whereas, average river flow is 91.23 m³/s, minimum is 7.33m³/s while maximum/flood flow is 326m³/s. It is possible to grow most of the crops in two seasons except yams, wheat, and cassava. The water quality of the source river has been confirmed to be acceptable for irrigation.

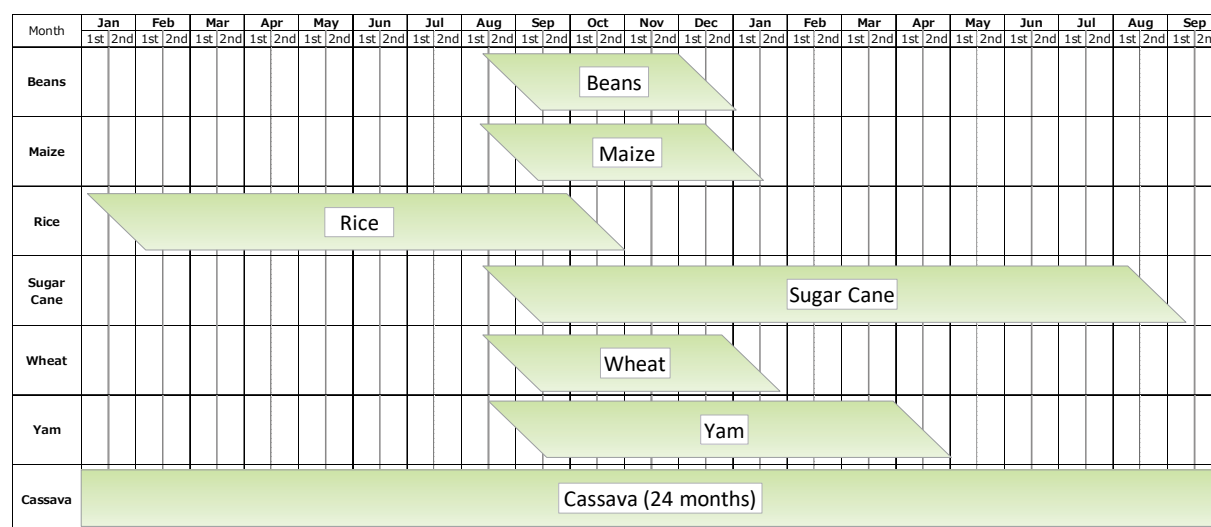
The results were also compared with the World Health Organization (WHO) standard for drinking water. The pH was determined to be 6.83 ± 0.80 during rainy season which was slightly acidic and 7.70 ± 0.12 during dry season which was slightly alkaline. The relatively high level of heavy metals indicates slight degree of contamination. More of the other parameters determined were below or within the range of WHO standard for drinking water except turbidity.

This rivers and streams dries off during the dry season while in the wet season; they swell off their water or increase their volume of water content. This in turn have a negative impact on economic base of the people in the study area such as farming and fishing (Rimi, 2008). All the schemes in the Nasarawa Irrigation project are of gravity type without any being pressure (sprinkler, drip or central-pivot) type. The proposed irrigation type is gravity-furrow involving conveyance of irrigation water through pipeline to the respective schemes and farm-blocks, delivering to trapezoidal shape main and field channels.

6) Agricultural development plan

i) Farming management plan

Seven crops are planned to be grown: rice, sugarcane, beans, yams, cassava, maize, and wheat. All crops except yam, cassava, and wheat are planned to be cultivated in two seasons. The cropping schedule which was applied to the calculation of irrigation water requirement is shown in the figure below.



Note: Prepared by the JICA Survey Team based on the results of water requirement calculations. A one-month difference in cultivating period was assumed.

Figure 4-18 Cropping schedule applied to the calculation of irrigation water requirement

ii) Agricultural extension plan

The establishment of irrigation agriculture requires agriculture extension service using highly qualified and experienced personnel. Use of local personnel would be most advantageous though required extensive training and seminars.

In the first year of operation, much of the initial land preparation normally carried out by the farmer would have been completed as part of the construction phase of the project. Levees, farm ditches and drains will have been formed mechanically. In succeeding years, it would be the choice of the farmer or group of farmers to decide on the extent of mechanisation to be employed on a cash-paying basis. Other agriculture and extension services responsibility includes;

- Deploy available extension staff to ensure adequate coverage of farms contained in the sub-project.
- Prepare, as required, cropping patterns together with agronomic schedules for each crop.
- Organise the project transport fleet. Whenever possible, use should be made of motor cycles and bicycles for junior staff.
- Liaise with the research departments at various institutions on crops, field trial for new breeds, seed multiplication and distribution, pesticide and herbicide trials and pisci-culture.
- Train, instruct and guide farmers on appropriate agronomic schedules, and to assume responsibility for the timely distribution of seeds, fertilizers and chemicals.
- Organise maintenance of tertiary canals and drains by the farmers.

7) Facility plan

The proposed Nasarawa Irrigation project consists essentially of the following major and sub-major component works:

- Intake/water structure and Conveyance Pipeline.
- Main Canals; supply canal and drainage
- Sub Canals and Field Canals; supply canal and drainage
- Concrete Works; inlet structures, diversion weirs, turn-outs, outlet structures, culverts, etc.
- Support Structures; access road, field roads, surveillance road, buildings, foot bridges, metal grillage covers, railings, perimeter fence, etc.
- Buildings; farm-house/office, warehouse, recreation, staff quarters, power supply, water supply, miscellaneous works, etc.
- Ancillary Works; compensations and ESMP, water supply, power supply, power generators and transformers, field operation equipment. Training.

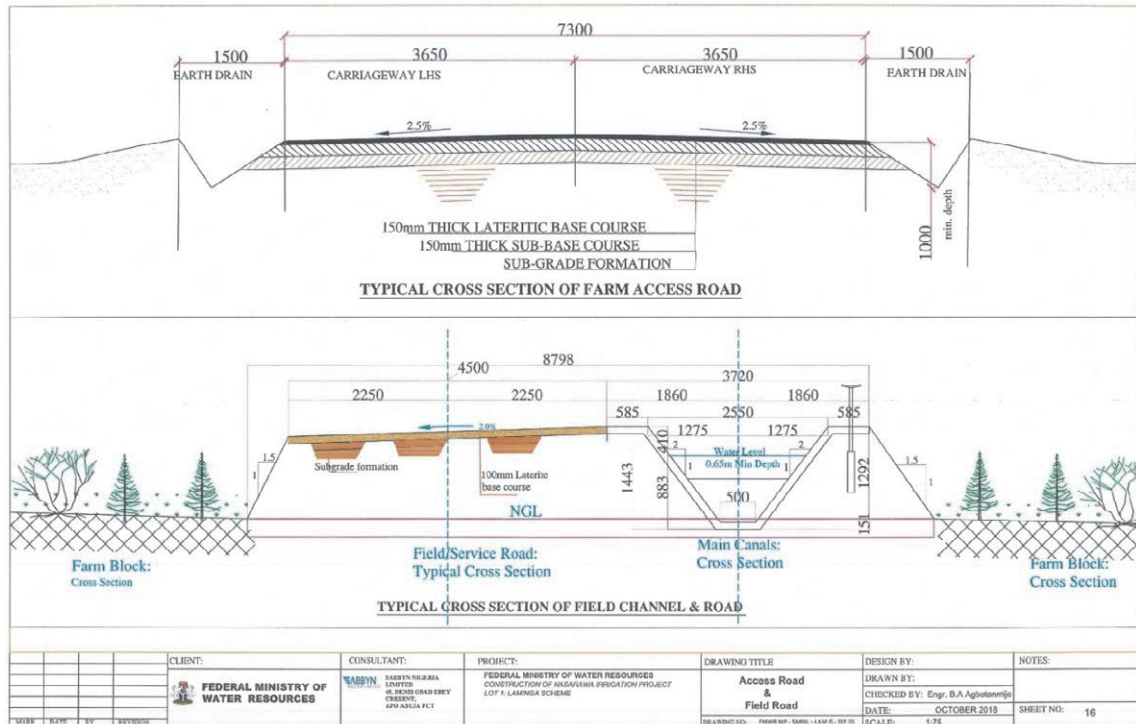


Figure 4-19 Cross-section of access roads, main canal, and maintenance roads

i) Intake structure

For Laminga and Gurata schemes, a suitable point was located at a central point between Okporo, Amba and Shaba. The proposed weir is about 1km long, to impound about 325,000m³ of water at elevation of 290m amsl. Total water requirement for the two (2) schemes is 69,840m³/day.

ii) Summary of Irrigation Facilities

The descriptions and quantities of the main irrigation facilities in Laminga scheme are shown in the table below.

Table 4-35 Descriptions and quantities of the main irrigation facilities in Laminga scheme

No	Description	Quantities
1	Conveyance Mains; 2 bar UpVC pipeline	3km
	Trapezoidal shape reinforced concrete grade 25	11km
2	Main / Sub-canal and field canals in trapezoidal shape earth drain, the base lined with clay or grade 15 concrete.	63.8km
3	Access road; 10.3m wide with triangular earth side drains of 1.5m top-width and 1.0m minimum depth,	60.7km
4	Field road; 4.5m wide with triangular earth side drains of 1.0m top-width and 0.65m minimum depth	454500
5	Canal Support; drop, under-pass,	18 Nos
6	Road Crossing; normal under-pass with pipe-canal	12 Nos
7	Drainage; discharge channels; 0.8m bed width x 1.2m top width x 1.0m trapezoidal channel	18.2km
8	Culverts; 900mm diameter x 11m long,	42 Nos
	900 diameter double pipe culverts	11 Nos
	1.2m x 1.0m BC	10 Nos
9	Pedestrian foot-bridge; 2.5m long x 1.5m wide x 0.2m thick with GI railings	600m
10	Water Point/Fire hydrants; post type,	15 Nos
11	Stone-dump at outfall/discharge; 9.6m ³ per discharge point.	24 Nos

8) Ancillary facilities

The farm-house/office for the irrigation project consists of (i) 440m² offices building, (ii) 360m² warehouse and (iii) 250m² plant-yard¹⁷⁸. Staff Quarters are also provided, expected to be at about 1km radius from farm-house/office. Staff quarters in each of the irrigation scheme consists of:

- 6 units of 85m²-single bedroom building,
- 6 units of 128m², 2-bedroom building,
- 4 units of 180m², 4-bedroom building,
- 250m² neighbourhood centre building and recreation area,
- Internal road network with street-light,
- Electricity supply through public and stand-by generators,
- Water supply systems through mini-water works or boreholes with overhead tanks

9) Farm machinery

The design proposed that each of the four (4) irrigation schemes would need to be provided with furrow irrigation operation equipment as listed below:

Table 4-36 Required field machinery and quantity

No	Equipment Description	Quantity
Field Equipment		
1)	Tractors 75-80 BHP- 4-wheel drive ploughs - mould board	2 Nos
2)	furrow reversible Disc harrows	3 sets
3)	Tool bar with cultivation tines incl. sub-soils	3 sets
4)	Tractors - 45-50 BHP - 2-wheel drive ploughs - mould board	2 Nos
5)	Tool bar with cultivation tines including bodies Seed/ fertiliser drills (rice)	3 sets
6)	Seed/ fertiliser planters (maize, sorghum, cotton)	3 sets
7)	Combine harvesters	3 sets
8)	Stationary corn sheller (15t/h)	3 sets
9)	Corn grading machine	2 Nos
10)	Mowers - 1.5 m cut - (drains large)	4 Nos
11)	Auto scythes - 1 m cut - (drains small)	3 sets
12)	Portable pumps (10)	4 set
Earth Moving Equipment		
13)	Grader; Caterpillar or similar + tool bar and equipment	2 Nos
14)	Ditching plough with accessories	3 sets
15)	Excavator back acting digger	2 Nos
16)	A-frame ridger for levees with accessories	4 sets

10) Operation & maintenance

In the F/S report, it is proposed that a structure as shown in the figure below be established for each scheme to carry out operation, maintenance and management. FMWRS, LBRBDA (Lower Benue River Basin Development Authority), Nasarawa State Ministry of Agriculture, etc. are expected to serve as directors, and it is planned that dedicated staff will be assigned to each department.

However, this system is different from the participatory water management that has been introduced

¹⁷⁸ Although these facilities are not clearly explained in the F/S report, they are considered necessary to cover the entire Nasarawa Irrigation Project (4 districts).

in recent years. As part of the system for participatory water management, water user associations are formed for each level, such as tertiary canals and secondary canals, and are responsible for managing terminal facilities, planning water distribution, and collecting water usage fees. Meanwhile, it is envisioned that LBRBDA will maintain and manage core facilities and provide agricultural machinery services and agricultural extension services along with A Scheme Executive Council (SEC) structure consisting of both parties is (see Figure below)

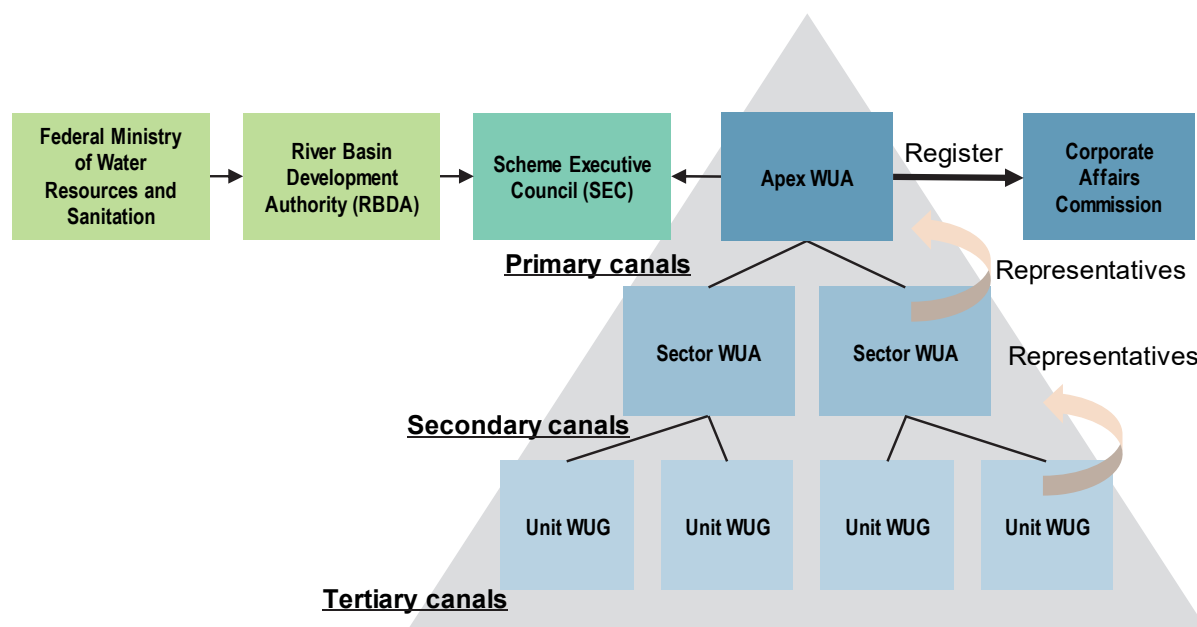


Figure 4-20 Organizational structure for operation and maintenance of irrigation scheme

11) Project cost and benefit

i) Project construction cost

The Nassarawa Irrigation Project will be designed to serve small, medium and large-scale farmers. The total cost estimate for 4 schemes is approximately N27,580.50 million, while annual costs for the maintenance and operation is approximately N 160 million, while total cost of all ancillary works is N 376 million. The project cost for Laminga area is N 7,985.52 million. The construction cost breakdown is as follows.

Table 4-37 Breakdown of project costs in Laminga area

Bill No.	Description	Cost Estimate (N 'million)
Bill 1	Preliminaries	404.07
Bill 2	Water Intake and Supply	861.634
Bill 3	Irrigation Systems	3,224.721
Bill 4	Main Access Road	468.29
Bill 5	Buildings; office, staff quarters, etc.	499.55
Bill 6	Miscellaneous Works	725.36
	Sub-Total; Permanent Works ¹⁷⁹	6,102.38
	Add 10% Contingency	610.39

¹⁷⁹ The amount does not match to the sum of Bill 1 to 6 (sum; 6,184).

Bill No.	Description	Cost Estimate (N 'million)
	Sub-Total	6,712.619
	Add 5% VAT	335.631
	Grand Total ¹⁸⁰	7,985.52

The price fluctuation coefficient is calculated using the 62-month price increase rate from the time of the F/S report (September 2018) to October 2023 based on the IMF's Inflation, average consumer prices (unit: Percent change). The result is 2.206. The total project cost, taking into account the inflation rate, is N7,985.52 million x 2.206 = N17,616.06 million ($\approx$ 27.9 billion yen). ¹⁸¹

ii) Project benefit

By providing suitable irrigated farmland to many farmers in the project areas in the five LGAs, the following project effects will be brought about. ¹⁸²

- Increased agriculture products through large scale farming,
- Public health, propensity for healthier socio-economic and hygienic living environment,
- Propensity for increased living standard, improvement in income and employment opportunities,
- Higher income and improvement to the government agencies involved in the administration of the irrigation schemes

iii) Project evaluation

The total irrigation development cost is estimated at N 27,580.54 million including bulk and infield infrastructure costs. If these amounts were amortised over a 20-year period with an interest rate of 12% per annum, the annual cost would be N 28,220 per ha respectively. From a production programs gross margins for the selected enterprise were estimated. Gross margins represent income from the sale of the crop less all direct costs that can be allocated to the production of the specific enterprise.

Table 4-38 Result of economic evaluation

Parameters	Laminga (6,600Ha)
Gross Income	93,960.00
Production Costs	46,370.00
Gross Margin	47,590.00
Overhead Costs	31,476.00
Net Income	16,114.00
Capital Costs	120,000.00
IRR ¹⁸³	12.25%

The irrigation project is a stand-alone investment of the Federal Government of Nigeria. The economic analysis covered 40 years, including project construction period. Project benefits and costs

¹⁸⁰ The amount does not match to the sum of Sub-total and VAT (sum; 7,142).

¹⁸¹ January 2024 JICA Exchange Rate NGN1 = ¥ 0.158390

¹⁸² There is no quantitative evaluation in the F/S report.

¹⁸³ The calculation method was checked with the local consultant who performed the F/S, but details were not available.

were estimated on a “without” and “with” project basis, appropriately apportioned according to whether tradable or non-tradable and including adjustments for the no incremental and incremental project benefits.

The EIRR of the entire project in the F/S is 12.3%, and referring to the national policy interest rate as a guideline long-term interest rate, it was 11.5%¹⁸⁴ in 2021, and the EIRR of WB's TRIMING was 13.5%¹⁸⁵. Therefore the EIRR of this project is considered a reasonable value as there is no large deviation from those values, but verification is required.

(2) Duku Lade IP

1) Background of the project

The construction of a weir on the Lade River in 1953 marked the beginning of irrigation development in Pateri LGA. Currently, rain-fed farming is carried out in 800 ha for rainy season crops, and irrigated agriculture in 5 ha or less is carried out using water from a weir and groundwater for dry season crops.

2) Outline of the project

The Federal Ministry of Water Resources and Sanitation, is desirous of constructing a small earth dam to replace the existing small weir on the Lade River with the aim of expanding irrigation activities. During the early stage of rice planting in June, rainfall is usually inadequate for the rice fields in the upland area. Additional water is diverted from the Lade stream to the fields through a network of unlined earth canals and field ditches. This permits rice cultivation in upland area, where traditionally this could not have been possible. F/S study has uncovered the inadequacy of the current weir at Lade in meeting water requirements for dry season farming. It was established during interactions and study that the current irrigation sphere is limited to water supplementation for rainfed rice cultivation during the rainy season within the irrigation district being fed by water from the Duku Lade weir.

During the dry season, the rice fields are left uncultivated because of inadequate supplies from the weir, even though the stream is perennial. The available during the dry season is barely enough to irrigate 5 ha of the total area of 800 ha that are devoted to rice cultivation during the rainy season. The construction of a dam to store up water during the rainy season would not only permit rice cultivation during the rainy season, it will enhance irrigation activities for dry season farming. This will allow the famers to diversify crop production to other cash crops such as vegetables, including tomatoes, onions and pepper, which can improve the revenue base of the farmers.

Therefore, this project aims to realize irrigation of dry-season cultivation and to expand the irrigated area through planning and design of appropriate reservoirs and irrigation facilities. An earth dam can therefore meet the water supply needs for expanded irrigation project to enhance food security in Pategi LGA and the region as a whole.

¹⁸⁴ Annual Economic Report 2021, Central Bank of Nigeria

¹⁸⁵ Transforming Irrigation Management in Nigeria Project, Project Appraisal Document, WB, 2014

The expansion of Duku Lade Irrigation Project will require the construction of an earth dam in Lade. Assessment of the topographic maps and field surveys indicated three possible sites shown in Tabel 4-38. Current evaluation of the merits of the sites has indicated that the most feasible location for the dam should be on at 3 km upstream of the Lade bridge at a confluence (Site 3).

Table 4-39 Hydrological parameter of dam sites

Parameter	Proposed dam site		
	Site 1	Site 2	Site 3
Location	3.5 km downstream of Lade bridge	2.5 km downstream of Lade bridge	3.0 km upstream of Lade bridge
Catchment area(km ²)	191.52	188.21	161.47
Main river length (km)	26.8	21.38	20.38
Average slope (m/m)	0.00802	0.00842	0.00842

The impounded water in dam may be used for the following purposes:

- Water supply for Lade, Bisan, Sakpefu and Dakani.
- Irrigation within the watershed for cultivation of rice, vegetables and other crops.
- Fisheries and other recreational activities.

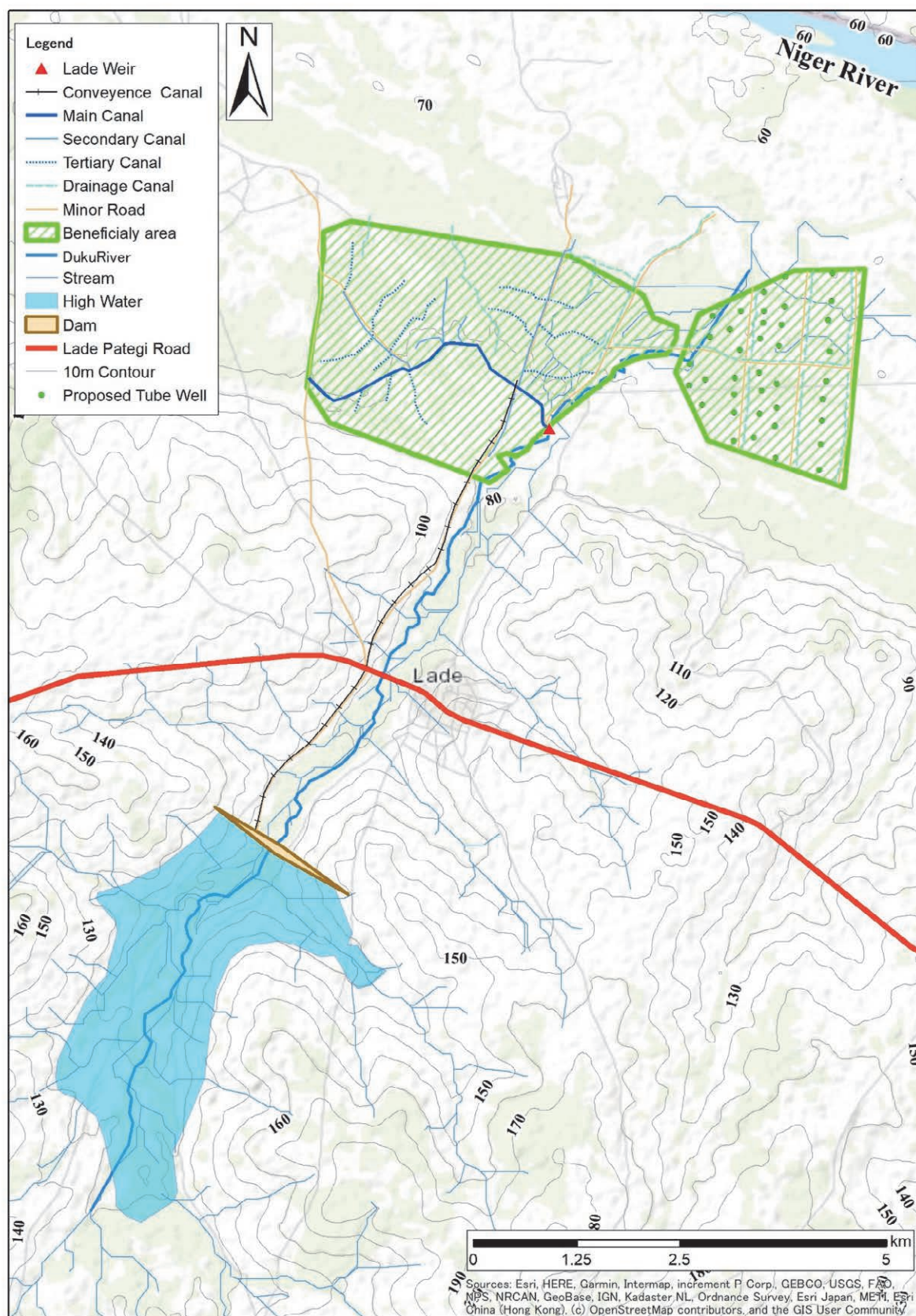


Figure 4-21 Location map of the planned area including candidate dam sites (Sites 1-3)

3) Major water resource of the project site

The dam will form a part of the comprehensive plan for the rational development of the water resources of the Niger basin. The intent of the construction will be to serve the water requirements for irrigation for such villages as Lade, Bisan, Sakpefu and Dakani, which surround the current irrigation district.

The average annual precipitation in the project area is 1,178 mm, with a catchment area of 161 km². At a storage capacity of 33 Mm³. This represents 205 mm of runoff depth. This is 17.4% of the total precipitation volume, which may be considered conservative considering the topography, soil and land use patterns, vegetation, and geology of the watershed. However, in order to allow for over- year storage, the reservoir capacity was selected as 40 Mm³. This will allow nominal reservoir operation for 1 in 5 drier years.

The reservoir area is shown in Figure 4-21. The total area of inundation at the full supply level was 5.04 km², with a storage capacity of 41.62 Mm³. The maximum water surface elevation rises to 117.5 m from the normal pool level of 116m. The dam crest was set at 119m asl to give a minimum freeboard of 1.5 m and a normal freeboard of 3 m.

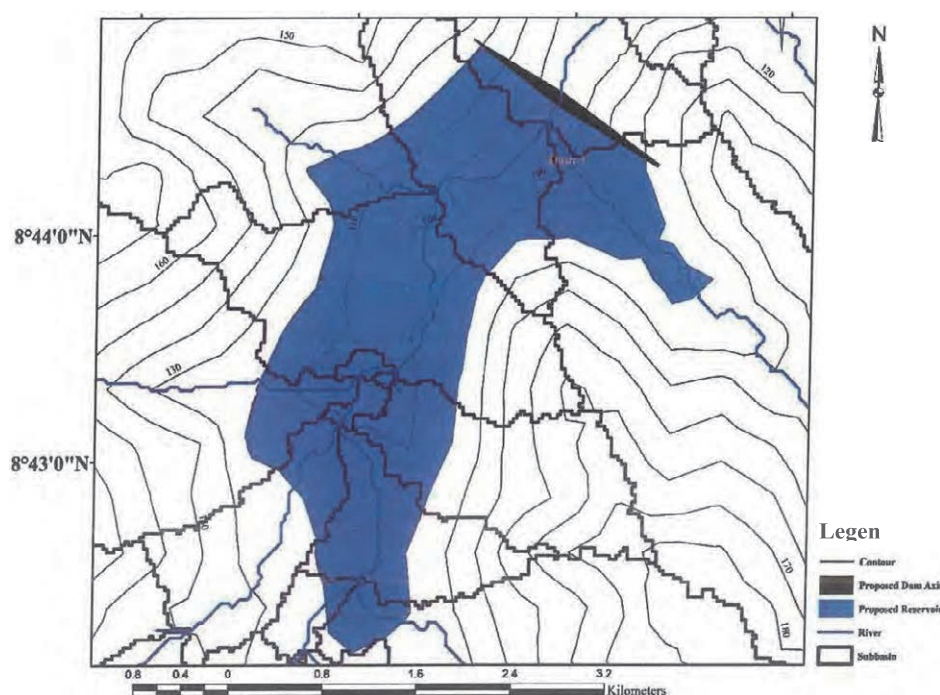


Figure 4-22 Map for water storage area

The available water for irrigation may be of the order of 25 - 30 Mm³, which is enough to irrigate an area of 800 ha. This will expand the current scope of irrigation to dry season farming of other cash crops such as vegetables (tomatoes, onion, pepper etc.) rather than supplementation of rainfed agriculture that is currently the vogue in the irrigation area. Thus, double cropping will be possible in the fields rather than current single annual cropping of paddy rice. The table below shows Runoff and water demand for each month.

Table 4-40 Runoff and water demand for each month

Month	Runoff (Mm ³)	Water demand (Mm ³)		
	Mean monthly inflow	Irrigation and Livestock	Rural water supply	Total
Jan	1.3	5.18513	0.51851	5.70364
Feb	0.27	7.20575	0.72058	7.92633
Mar	0.4	5.63898	0.5639	6.20288
Apr	1.66	0.71896	0.0719	0.79085
May	2.67	0	0	0
Jun	2.94	0.52238	0.05224	0.57461
Jul	4.03	0.46745	0.04675	0.5142
Aug	3.87	0.65789	0.06579	0.72368
Sep	5.21	1.85279	0.18528	2.03807
Oct	5.63	0.75081	0.07508	0.82589
Nov	3.24	0	0	0
Dec	1.99	3.6551	0.36551	4.02061
Total	33.21	26.6552	2.66552	29.3208

Use of water by the community from the new dam will require the construction of a mini - water treatment plant with estimated capacity of 0.0318 m³/s (=2,750m³/day or 1.0 Mm³ per annum).

The table below shows the breakdown of water availability, taking into account domestic water supply, irrigation, net losses, and dead storage.

Table 4-41 Water availability and allocation

Uses	Annual Volume(Mm ³)
Domestic water supply	1
Irrigation	25
Net Losses (Evaporation and storage)	4
Dead storage	3
TOTAL Availability	33

4) Major components of the project

The project consists of the following:

- Zoned earthfill embankment dam with central impervious clay core
- Ogee concrete spillway with stilling basin
- Irrigation and water supply facility
- Access Road
- Site facility and services

The outstanding component of the project is the earthfill dam, which has the following main features;

Table 4-42 Specifications of the Lade Dam

Hydrology	
Length of dam	1,620 m
Dam crest elevation	119 m

Maximum height from lowest foundation level	25 m
Max width at Base	120 m
Volume of earth fill	236 Mm ³
Total reservoir capacity	42 Mm ³
Reservoir area as full supply level	5.04 km ²
Elevation at full supply level	116 m asl
Probable maximum flood	584 m ³ /s
Active storage	38 Mm ³
Annual yield	33 Mm ³
3-Day volume	9 Mm ³
Reservoir	
	Elevation (m) Vol. (Mm³) Area (km²)
Retention Water Level (RWL)	116 41.63 5.03
1:10,000-year Flood Level	117 47.04 5.763
Minimum Operating Water Level	103 3.83 1.113
Dam	
Type	Zoned earthfill dam
Crest Elevation	119m
Maximum Height	24m
Length of Crest	1545 m
Embankment Volume	236 Mm ³
Main Spillway (Outflow)	
Type	Free Flow
Crest Level	116 m
Crest Length	50 m
Maximum Discharge (Return period 10,000year)	330 m ³ /s
Outlet Works	
Control	Howell- Bunger Valve
Capacity	3 m ³ /s

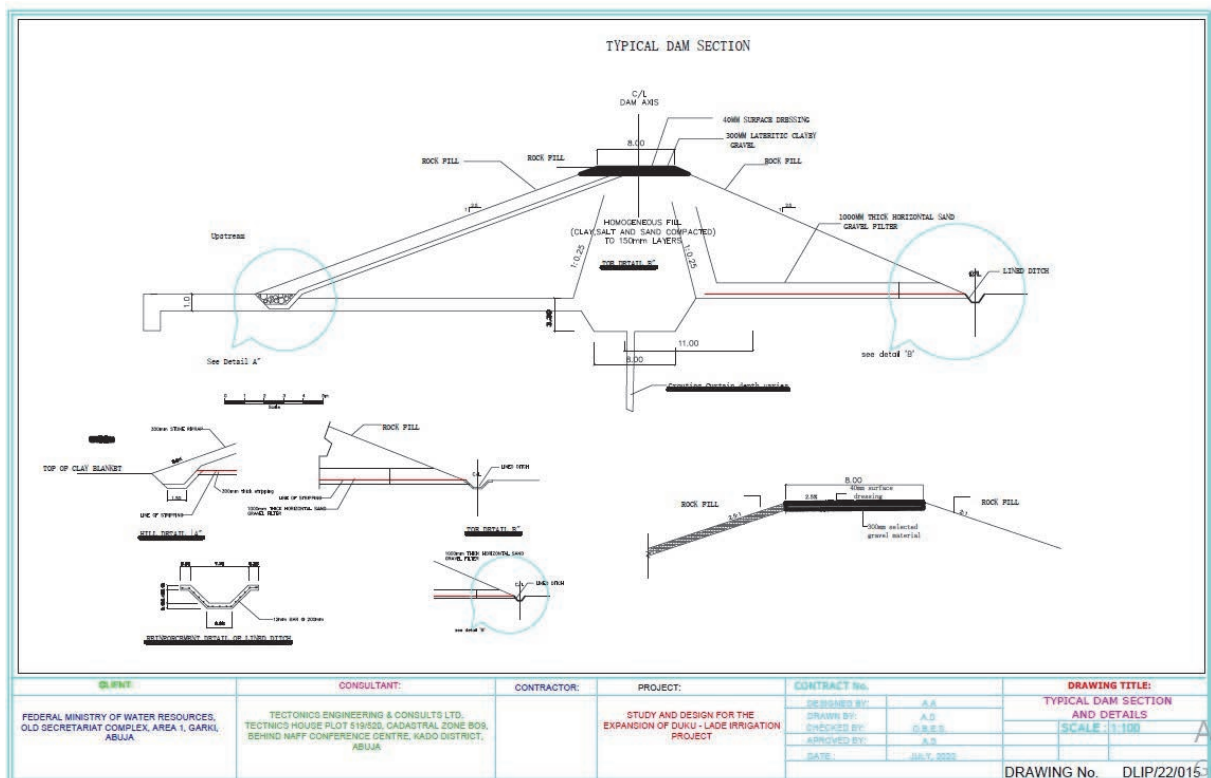


Figure 4-23 Typical dam section of Lade dam

These data were used in the hydraulic analyses for check on the spillway, irrigation release facility and water supply outlet works.

5) Major irrigation facility

i) Transmission canal

This canal links the water release facility at the dam to the irrigation area, 6 km downstream of the dam location. It is designed as a lined concrete canal on a slope of 0.009 and with a trapezoidal section. It is assumed that the reservoir will be at full supply level in December when irrigation for dry season cropping will commence so that the full head will be available for water releases for irrigation. The maximum discharge is $6.12 \text{ m}^3/\text{s}$ at the full supply level of 116 m asl, while the minimum discharge will be $3.14 \text{ m}^3/\text{s}$, which should be adequate for irrigation activities in May.

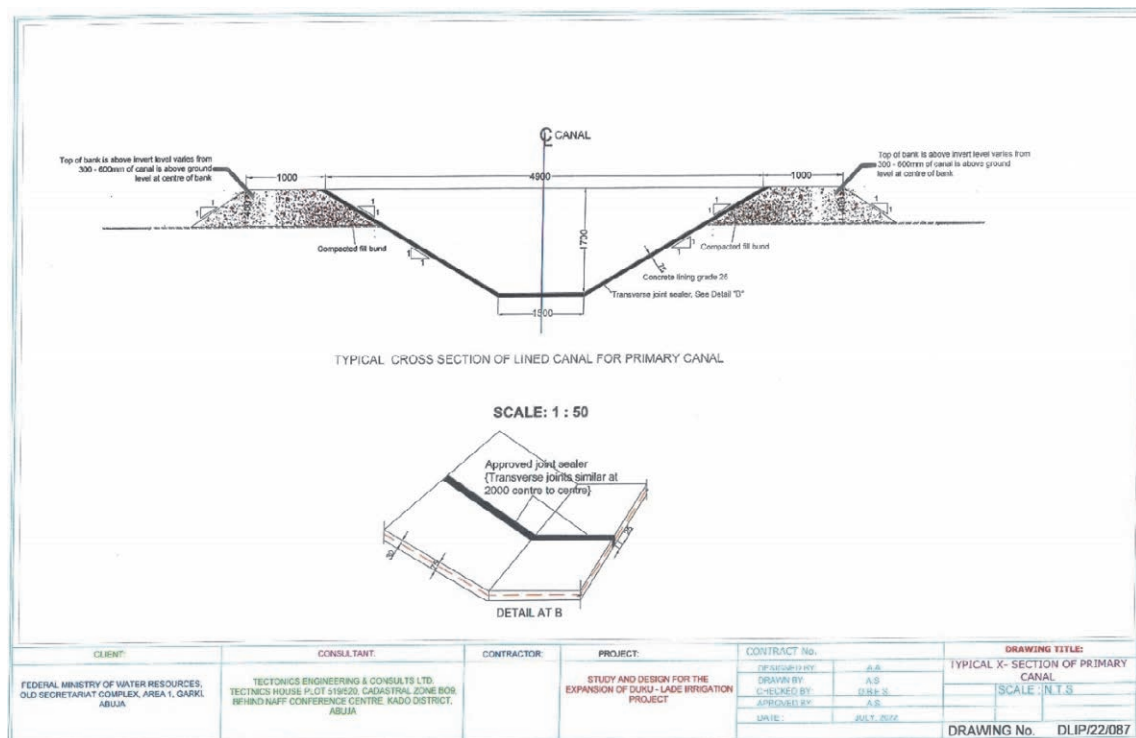


Figure 4-24 Cross section of primary channel and management road

The actual amount of water released depends on the monthly crop water requirements and the daily irrigation hours. As shown in the table below, the maximum water requirements for each month were analyzed for three different irrigation schedules of 12, 10, and 8 hours. It shows that during the peak water demand in February, irrigation hours should not be less than 10 hours per day in order to match the maximum flow rate from the reservoir.

Table 4-43 Maximum flow rates for each irrigation hours

Month	Specific discharge for irrigation of (L/s/ha)			Maximum flow rates for irrigation of (m^3/s)		
	12 hours	10 hours	8 hours	12 hours	10 hours	8 hours
January	20.10	24.12	30.15	4.02	4.82	6.03
February	25.33	30.40	38.00	5.07	6.08	7.60
March	22.36	26.83	33.54	4.47	5.37	6.71

April	8.01	9.61	12.02	1.60	1.92	2.40
May	0.00	0.00	0.00	0.00	0.00	0.00
June	3.09	3.71	4.64	0.62	0.74	0.93
July	2.75	3.30	4.13	0.55	0.66	0.83
August	3.40	4.08	5.10	0.68	0.82	1.02
September	0.00	0.00	0.00	0.00	0.00	0.00
October	11.34	13.61	17.01	2.27	2.72	3.40
November	0.00	0.00	0.00	0.00	0.00	0.00
December	10.82	12.99	16.23	2.16	2.60	3.25

ii) Main canal

The water is delivered to the field directly through the main canals that run northwards from the confluence with the transmission canal from the dam irrigation release facility, which in turn discharge into the secondary canals for distribution to the irrigation fields.

The main canal has a total length of approximately 5 km on a slope of 0.013. It is designed as a trapezoidal section with a side slope of 1V: 1 H. The main canal is fed directly by gravity through its transmission canals. Each of the canals commands the following areas:

- Canal 1: 1,200ha
- Canal 2: 800ha
- Canal 3: 400ha

Along the main canals are secondary canals that distribute water to one or more tertiary canals. In view of the desire to cultivate rice in this area of the irrigation project, basin irrigation will be practised. Cross culverts will be located at 1km interval on the canal for crossing of man and animals over the canal.

iii) Secondary canal

There are 3 secondary canals with a total length of 12 km. They are designed on a slope range of 0.005 to 0.009. All the canals are of trapezoidal section and command an irrigation area of 400 ha.

iv) Tertiary canal

The tertiary canals will shoot from the secondary canals. Each secondary canal will distribute water to four tertiary canals, each of which will command an irrigation area of 100 ha, 50 ha on each side. All the tertiary canals are designed as unlined channels with Manning's coefficient of 0.030 and the side slope of the canal was chosen to be 1V:2H. The tertiary canal will have a service road of 4m width for farm machinery and general accessibility to the fields for evacuation of harvested produce.

v) Overnight retentive reservoirs

In order to allow some flexibility in the operation of the surface irrigation system, two overnight storage reservoirs are built to allow more amenable water supply to the farmers. (There is no detailed description of the capacity or layout of the overnight retentive reservoirs in the F/S report.).

Other facilities are as follows:

- Emergency canal spillway: the flow in an irrigation canal network is susceptible to spill due to jamming of the control gates, maloperation of the canal gates and distributors by famers and farmers not taking delivery of their scheduled water supply. Uncontrolled and unprotected spilling would undermine the canal system and may damage crops. Spillways are therefore provided at the end of the main canal to allow release of unutilized water in a safe manner into the primary drainage channels.
- Canal drop structure: This is provided at points along the canals to aid water level control and energy dissipation at points where reduction of slope is accomplished over a short distance.
- Canal regulators: These are provided in the main canals in order to raise the water level sufficiently to feed offtake canal as well as providing storage in the canals
- Canal intakes: An intake structure provides the regulator mechanism into the offtake canals. They are mainly provided at the heads of the offtake canals. When an off-taking canal can leave less than 75 % of the discharge in the parent canal, downstream distributors may be considered. The proportion can be adjusted by varying the control opening.
- Canal road crossings: At locations where canals have to cross proposed roads, concrete box, and pipe culverts are provided. However, where there are level and elevation constraints, an inverted syphon can be provided.

6) Development of right bank floodplain

Salient data were also collected on ground water condition in the flood plains of River Niger downstream of the Duku Lade weir. The area is completely submerged during the rainy season and is not available for rainfed agriculture. The plain dries after flood recession during the dry season and area is used for rice cultivation by tube wells built by the interested farmers. The flood plain has high water table, of less than 3m depth and as low as 1.5 m below the surface. The water is drawn by surface water pump, 5 - 7 hp, driven by petrol engine. The range of measured flow rates for the irrigated field is 2 - 4.50 litres per seconds, or 7.56 - 12.20 m³/hr. A wash borehole is usually constructed to irrigate 1 acre. During peak water requirement by rice, a range of 90.72 - 195 m³ may be delivered to the field per day by the pump.

The data show the potential for expansion of the Duku Lade Irrigation Scheme to the downstream area of river Niger flood plains that are not accessible for farming during the rainy season. Tube wells can be bored to depths of not more than 20 m for dry season irrigation. The static water table is low and drawdown from the wash tubes after eight to twelve hours of pumping was found to be low at less than 2.5 m. This indicates abundance of ground water resources within the flood plain that can be harnessed for irrigated agriculture. It has been determined from the hydrologic studies that the available water within the Lade catchment of 192 km² can only irrigate 1,200 ha of the arable land of the watershed. The current irrigation area under supplementary irrigation of rainfed agriculture is 800 ha. The dam and reservoir, if constructed will allow expansion of the irrigation field by 400 ha. This can be covered by

the storage capacity of the reservoir, which is set at 40 Mm³ per annum, for an annual runoff of 33 Mm³, to allow for firm water availability in drier years.

There exists vast arable land downstream of the Lade weir that is flooded during the rainy season partly by the stream flows from Lade River which cannot enter the river Niger at high tides. The construction of the Lade dam will store up this runoff and reduces flooding in the immediate vicinity of the weir downstream. This area can be used for dry season irrigation farming but only if tube wells are bored in the flood plain. The water from the reservoir cannot cover this area. It was assessed that 400 ha of the land can be developed for irrigation by tube wells. Experience from the field works and interactions with the farmers had shown the viability of this option. Usually the famers have been practicing tube well irrigation in the flood plains on an individual basis. They often bore a tube well per half acre, the borehole being drilled to no more than 10 - 12 m depth and cased with 75 mm PVC pipe. Water is drawn for irrigation by 7 hp surface centrifugal pumps powered by petrol engine. Measurement was taken during the field work and it was found the flood plain to be high yielding with low ground water depth of 1.5 - 2.5 m. Therefore recommendations are made for tube well irrigation based on the following parameters:

Table 4-44 Specification of irrigation development by using tube well installation

Item	Spec.
Service area per tube well	2,500 m ²
Depth of well	20 m
Depth of the gravel pack	15 m
Well screen	5 m
Surface pump	7 hp
Total area of irrigation	400 ha
Number of tube wells	1,600
Number of surface pump	800

This option, if implemented will require up to N560 million.

7) Outline of road development

Three types of roads have been proposed for access and service within the project area. The roads shall be constructed of well compacted fill materials that are available in upland areas of the project area, as detailed in the geotechnical investigation. Pipe culverts will be provided for the smaller drain crossings, while reinforced concrete culverts are to be provided for larger discharges for stream crossings. The access road from Lambata to the irrigation area is currently in bad condition and the culverts are poorly constructed, where they exit.

The service roads that are associated with the primary canals and the conveyance pipelines will be earth roads. The base course of these roads should be well compacted fill materials to a minimum depth of 0.30m. All other service tertiary roads should have fill material depth of less than 150 mm thick base course.

There will be 6m service road of lateritic surfacing. In addition, cross culverts will be constructed at lateritic spacing on the main canal. A service road of 6m width with lateritic surfacing will be provided

on the left side of the canal. The shoulder should be 1.5 m and 1.0 m respectively for the access and secondary roads. No shoulder should be provided for the service and field roads.

Table 4-45 Access road types

Type	Location	Width of Carriage way	Surfacing
Access Road	Transmission canal from dam to irrigation area	6.0 m	Asphalt
Secondary roads	Main canal	6.0 m	Lateritic
Tertiary roads	Secondary canals	-	Laterite
Tertiary road	Tertiary canals	4.0m	Laterite

8) Ancillary facilities

The irrigation project will require management infrastructure for the day-to-day operation of the irrigation facilities. A single management site is proposed with administrative building, locker room and lavatory building for workers, a workshop, a park for mechanical equipment, storage rooms for chemicals, fertilizers and light Farm equipment. A yard of 0.5 ha is proposed with the following facilities:

- Perimeter fencing of barbed wire and galvanized iron pipe poles at centre to centre.
- Administrative building of 100 m² with 4 offices of varying sizes (15-25 m²) a kitchen, two lavatories and a lobby. A small conference room of 20 m² is provided to allow for meeting venues.
- Locker and lavatory building. The total floor space is 80 m² for farm employees.
- A workshop of 200 m² with three - phased power supply, gantry crane system for hoisting, a welding system and a ramp for tractor maintenance and repairs
- Storage building of 60 m² for chemical storage, fertilizer, seed storage and light farm equipment and tools.
- A park for storage of farm equipment like tractors, harvesters of 500m² area.
- A workshop of 400 m² with three - phased power supply, gantry crane system for hoisting, a welding system and a ramp for tractor maintenance and repairs
- Residential facilities for management and workers of the operations by the Lower Niger River Basin Development Authority, Ilorin and maintenance teams. These comprise of
 - 1 No 3-bedroom flat of 225 m²
 - 1 No 2 - bedroom flat of 190 m²
 - 1 No semi-detached of 2 No 2-bedroom flats 290 m²

9) Farm machinery

Management of the farm requires acquisition of farm machinery for its operations. The nature of the machinery required will depend on the management option adopted for the farm.

- Low technology option: This requires basic machinery for ploughing, harrowing and levelling in addition to few equipment for seed bed preparation and seed planting. It will require high labour input for pest and weed control and harvesting.

- High technology option: This requires few labour inputs with most of the farm operations being conducted by farm machinery including, ploughing, harrowing, seed bed preparation, seed planting, pest and weed control by spaying, harvesting and farm produce processing.

Details of the machinery required for the two options are shown in the table below. The low technology farm machinery will be recommended for acquisition since the farmers will be responsible for managing their individual farm units. The cost has been included in the bill of engineering measurements and evaluations.

Table 4-46 List of required machinery for the management options

Type of Equipment	Low Level	High Level
Tractors 75 hp	8	24
Rigid tine cultivator	8	15
Levelling harrow	8	9
Mould board ridger	6	9
Disc ridger	6	6
Seed drill (grains)		9
Ridger seeder		6
Precision seeder		6
Transplanter		6
Front mounted mower		6
Wagon loader		6
Rotavator (row full field)		6
Mounted spraying unit		6
Farm trailers (2 axled)	12	9
Knapsack sprayers	48	9
ULV sprayers	60	24
Tractor pulled land plane	6	9
Rolling cultivator	6	6
Steering hoe (front mounted)	6	6
Large vehicles		
Fertilizer broadcasters	6	6

10) Management of the irrigation scheme

Failure of past irrigation projects embarked upon by the government can be traced partly to poor management activities among other factors. The success of any irrigation project rests on high technical and administrative skills of the farmers. It is noted that the farmers had been managing the irrigation fields since 1953 when it was commissioned and has some skills in irrigated rice farming. However, skills in cultivation of other cash crops such as tomatoes, onion and pepper on a large scale may be lacking. It will be needed that the farmers be trained on the rudiments of vegetable farming and marketing.

It appears the farmers believe in their ownership of the plots transferred to them by their parents. Therefore, government control over the management of the irrigation project may be questionable or problematic. Indeed, there exists currently in the area, a Water User Associations to which all farmers that depend on water releases from the Duku Lade weir belong. The WUA has been responsible for management of the irrigation project for years. The Federal Government can allow the management of

the water releases from the dam and reservoir to WUA, but will limit their controls in matters relating to the safety of the dam and its infrastructures.

11) Agricultural extension plan

For a large-scale irrigation project of this nature, it is essential to have a testing irrigation farm within the project area. The farm will be devoted to surface irrigation methods. The testing farm will develop 1 hectare with 20 % of the area devoted to farm services. The facility will be used for technical training of extension workers and farmers and for preparation of technical and agronomical guidelines to ensure the success of agricultural practices with in the project area.

There is the need to provide extension services to local farmers that will participate m the irrigation-project. The services can disseminate information on new cropping techniques and promote the use of high technology in the management of the irrigation field. In providing the services, it is essential to train the trainers: i.e. extension workers. They can be trained in testing irrigation farm facilities.

12) Project cost and benefit

i) Total construction cost

The cost of implementation of the project was prepared and included estimates for dam construction (embankment, spillway and water release outlet works), irrigation works (canals, service roads, tube wells and surface pumps), drainage works, management infrastructures and farm machinery. The total project cost was estimated at ₦ 12,625,711,858, including 5% contingency, 2 % for capacity building, 2 % for management supervision, and 7.5 % for value added tax.

The coefficient of price fluctuation, based on the IMF's "Inflation, average consumer prices" (unit: Percent change) and using the price increase rate for 14 months from the time of the F/S report (September 2022) to October 2023, is 1.285. The total project cost, taking into account the inflation rate, would then be $N\ 12,625,711,858 \times 1.285 = \underline{N\ 16,224,039,737}$ ($\approx$ JPY 25.7 billion).¹⁸⁶

ii) Project evaluation

In the cost-benefit analysis, the level of mechanization was assumed to be at the low level. The breakdown of cropped area is also assumed in the table below.

Table 4-47 Cultivated area by crop for wet and dry seasons in the 1,200 ha project site

Crop	Area (ha)
Wet Season	
Rice	800
Maize	150
Sorghum	150
Cowpea	100
Dry season	
Rice	800
Wheat	100

¹⁸⁶ January 2024 Rate NGN1 = ¥ 0.158390

Crop	Area (ha)
Maize	100
Onion	100
Tomato	100

The table below shows the estimated costs of agricultural production activity during the dry and rainy seasons.

Table 4-48 Summary of cost estimation of irrigation project

Description	Qty	Unit	Unit Rate	Amount (N)
Wet Season				
Labourers for 6 months	1200	ha	126,400	151,680,000
Planting material	1200	ha	9,600	11,520,000
Tractor ridging	1200	ha	12,000	14,400,000
Fertilizer 400kg/ha	1200	ha	120,000	144,000,000
Pest and weed control	1200	ha	19,200	23,040,000
Investment cost recovery	3,696,000	m3	30	110,880,000
Senior staff salaries for 6 months	1	no	6,400,000	6,400,000
Superintendent	1	no	6,000,000	6,000,000
Tractor drivers, mechanics, intern staff	1		19,200,000	19,200,000
Subtotal for wet season				487,120,000
Dry Season				
Labourers	1200	ha	150,240	180,288,000
Planting material	1200	ha	9,600	11,520,000
Tractor ridging	1200	ha	12,000	14,400,000
Fertilizer 500kg/ha	1200	ha	120,000	144,000,000
Pest and weed control	1200	ha	16,000	19,200,000
Investment cost recovery	17,098,580	m3	30	512,957,400
Senior staff salaries	1	no	6,400,000	6,400,000
Superintendent	1	no	6,000,000	6,000,000
Tractor drivers, mechanics, intern staff 5 No	1		19,200,000	19,200,000
Subtotal for dry season				913,965,400
Grand total				1,401,085,400

Labour costs, Economic return, and Total cost are shown in the table below. The project evaluation results in a B/C of 1.79.

Table 4-49 Summary of the economic analysis

Description	Amount(N)
Labour Cost	Wet season 151,680,000
	Dry season 180,288,000
Total	331,968,000
Economic returns	Wet season 818,750,000
	Dry season 1,685,000,000
Total	2,503,750,000
Total Costs	Wet season 487,120,000
	Dry season 913,965,400
Total	1,401,085,400
Annual Profit	1,102,664,600
% Profit	79
Annual Benefit/ Cost ratio	1.79

4.5.7 Summary of project loan

Here, based on information gathered through on-site materials and interviews with related organizations, the project overview and project effects are organized as follows, in line with the items in the preliminary project evaluation sheet. However, in the F/S reports for both districts obtained from FMWRS, the farming plans and irrigation facility plans are unclear. In addition, the basic information such as local farming conditions, information on beneficiary farmers, river flow data, etc. has not been confirmed, and the calculation of required water volume and consideration of dam size, etc. are insufficient. Therefore, in the following description, the current status and issues of existing materials, etc. are clarified, and the information necessary for future consideration are organized in the next section (4.5.8).

(1) LamingaArea

A. Project Summary

1) Project Purpose

This project aims to improve agricultural productivity in Nasarawa State, north-central Nigeria, by constructing new irrigation facilities, procuring agricultural machinery, establishing an irrigation facility maintenance and management system through the formation of water user associations, and providing farming support. . This will contribute to strengthening Nigeria's food security.

However, since there is no data on current farming conditions, unit yields, farming plans based on available water resources, increases in production volume (increases in profits), etc., it is difficult to provide specific discription.

2) Project Site

Nasarawa State is adjacent to the FCT, which includes the capital Abuja, and the planned irrigation area is approximately 75 km southeast of Abuja and approximately 150 km from the state capital Lafia and is located near the border of Nasarawa LGA (population 190,000) and Karu LGA (210,000).

3) Project Contents

- i) Construction of new irrigation and drainage facilities (assuming 6,600 ha of irrigated area), construction and maintenance of related agricultural infrastructure (farm roads)
- ii) Procurement and placement of agricultural machinery (tractors, combine harvesters, etc.) and heavy machinery (graders, excavators, etc.)
- iii) Offices, warehouses, lodgings, vehicles, etc. for irrigation area operation and management.
- iv) Consulting services (detailed design, bidding assistance, construction supervision, water user association formation, organizational strengthening, farming support, etc.)

However, no consideration has been given to the water use plan, which is formulated by calculating

the water balance based on the amount of water required based on the farming plan and the amount that can be supplied based on river flow conditions, and the scale of the facilities that will take in and distribute this water. In addition, the location and structure of water intake facilities, main cross sections of waterways, route maps, etc. are unclear, making it difficult to verify facility plans and construction costs. The basis for the type and number of agricultural machinery and heavy machinery is also unknown.

4) Total project cost

As mentioned above, the total project cost in the F/S report is N7,986 million (=JPY 1,264 million), and the amount that takes into account price increases is N17,616 million (=JPY 2,790 million). However, the actual cost estimate based on the actual unit price in the vicinity of the project area and estimated unit price for major construction work is unknown, and as mentioned above, the scale of the facility is also not clear, so there is a lot of room for fluctuation. Considering examples from other countries, there is a risk that the project cost may be too low. In the study¹⁸⁷ for project formulation conducted during TRIMING, the estimated unit cost was 14,455 USD/ha for new construction of irrigation facilities and 8,233 USD/ha for rehabilitation. This is presumably a quote from a report by the International Water Management Institute (IWMI)¹⁸⁸. In the case of the Laminga area, since it is a new construction, multiplying the irrigation plan area by the unit price of new construction, it becomes 14,455 USD/ha x 6,600 ha = USD 95.4 million = JPY 13,582 million¹⁸⁹, which is a difference of five times. Therefore, it is necessary to closely examine it.

5) Project implementation period

It is estimated that it will take about 8 to 10 years based on similar cases in other countries, but the location and scale of the main facilities are also unknown, so it is necessary to properly plan and consider the main construction contents.

6) Project implementation structure

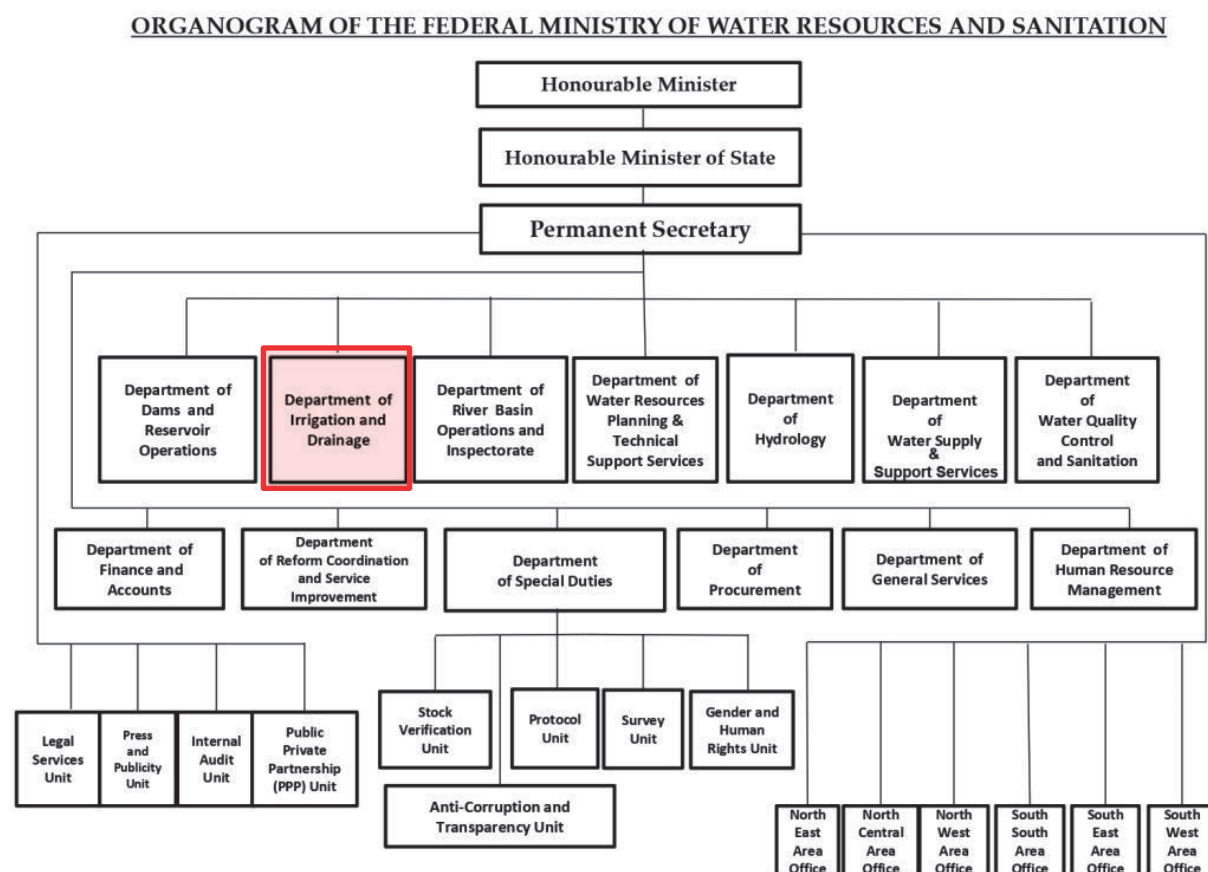
The borrower will be the federal government and the project implementing agency will be FMWRS. The organizational chart of FMWRS is shown below.

¹⁸⁷ Consulting Services For Feasibility Studies And Detailed Design Of Benue River Basin Water Resources Development And Management Programme For Formulation Of TRIMING II, Draft Pre-Feasibility Study Report, Volume I: Main Report, Enviplan International Limited, June 2023

¹⁸⁸ Research Report 109, Costs and Performance of Irrigation Projects: A Comparison of Sub-Saharan Africa and Other Developing Regions, IWMI, 2007,

https://www.iwmi.cgiar.org/Publications/IWMI_Research_Reports/PDF/PUB109/RR109.pdf

¹⁸⁹ JICA foreign currency exchange rate January 2024 USD 1=¥ 142.364



Sorce : <https://www.waterresources.gov.ng/organogram> (Accesed 9 February 2024)

Figure 4-25 FMWRS Organization Chart

The Irrigation and Drainage Department (I&D Dept.) is responsible for implementing irrigation projects, and the local River Basin Development Authority (RBDA) provides on-site operational support. In the case of Laminga area, it falls under the jurisdiction of the Lower Benue River Basin Development Authority (LBRBDA).

The Irrigation and Drainage Department is divided into five divisions: Irrigation Engineering Services (IES) Division, Drainage and Flood Control (DFC) Division, Irrigation Planning and Design (IPD) Division, Social and Environmental Services (SES) Division, and Irrigation Management (IRM) Division. The overall lineup is shown in the table below.

Table 4-50 Number of staff in the Department of Irrigation and Drainage

Item	Category	Number
Gender	Male	60
	Female	21
Type	Engineer	25
	Technician	35
	Natural Science	1
	Administrative	4
	Management	10
	Secretary	2
	Clerk	4
Total		81

As a concrete implementation structure, a Project Management Unit (PMU) will be established under the Director General of the Irrigation and Drainage Department, consisting of staff within the Department, to handle day-to-day operations. In addition, the Technical Implementation Unit (TIU), which is made up of specialized engineers and staff from other departments within the ministry, will deal with issues that arise during the project. For example, for issues related to dams, staff from the Dam Bureau, and for procurement, staff from the Procurement Bureau join the TIU.

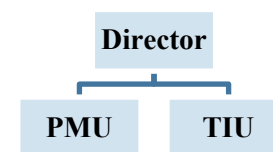


Figure 4-26 Project implementation structure

7) Collaboration and role sharing with other projects, other aid organizations, etc.

JICA promotes initiatives such as SHEP and CARD in its support for Africa's agricultural sector. Along these, Nigeria is also implementing or planning SHEP projects, grant aid projects for rice seed production, and technical cooperation projects. This project loan aims to improve the production infrastructure for various crops, and it is expected that the effects will be further enhanced by collaborating with the above projects and initiatives.

WB is implementing TRIMING in the irrigation sector, which will end in April 2024. SPIN is currently being prepared as a successor project, and the project will begin after internal procedures and approval from the Nigerian government. It is expected to begin in early 2025 at the earliest. This project loan excludes SPIN candidate areas to avoid duplication.

8) Environmental and social consideration, cross-cutting issues, and Gender considerations

i) Environmental and social consideration

- a) Category classification: A
- b) Basis for category classification: This project is a Category I project (requires approval based on a full-scale EIA study; equivalent to Category A of the JICA Guidelines) listed in Nigeria's EIA Procedural Guidelines as an "irrigation schemes covering an area of 5,000 hectares or more."
- c) Environmental permits: In accordance with Nigeria's Environmental Impact Assessment Law and the EIA procedure guidelines based on this law, provisional approval from the Environmental Assessment Department of the Federal Ministry of Environment is required before construction work can begin. The Federal Ministry of Water Resources prepared a report that included environmental and social considerations at the IEE level during the feasibility study, but it has not yet submitted an application for approval. In future surveys, it is necessary to improve the report so that the level and content are in line with the JICA Environmental and Social Consideration Guidelines.
- d) Pollution countermeasures: During construction, air pollution, noise, and vibration will be

generated, but countermeasures may be taken such as maintenance of construction vehicles and heavy machinery, water sprinkling, and banning the use of noisy vehicles and heavy machinery at night. In addition, sewage and wastewater from construction sites will be collected and treated in septic tanks before being discharged to reduce the impact. The excavated soil will be reused in the fields within the project area, and the remainder will be transported to the existing soil dump site. During operation, it is expected that the use of pesticides and fertilizers will have an impact on water quality, but this impact will be alleviated through the formulation of a management plan for pesticides and fertilizers, and technical guidance on proper use.

- e) Natural environment: The project area has a long history of human settlement and cultivation, and the natural vegetation and diversity has already been significantly reduced, and the diversity and abundance of wildlife is also very low. Waterfowl are diverse, but their numbers are small. The use of pesticides and fertilizers on irrigated farmland is expected to have an impact on water quality, but the impact can be alleviated by formulating a management plan for pesticides and fertilizers and promoting their appropriate use.
- f) Social environment: This project will involve land acquisition for the planned irrigation facility, but it is not expected that involuntary resettlement will occur. Owners of affected land and their crops will be compensated in a timely and appropriate manner.
- g) Other/Monitoring: During construction, the contractor will monitor air quality, noise/vibration, water quality, waste, etc. under the responsibility of the Federal Ministry of Water Resources, Once in operation, the Federal Ministry of Water Resources will monitor air quality, noise and vibration, water quality, soil, livelihood restoration, etc.

ii) Cross-cutting issues

Climate change countermeasures...This project is expected to help adapt to the effects of climate change by stabilizing agricultural water supply through the development of irrigation facilities.

iii) Gender considerations

Formulate irrigation facility design and construction plans from the perspective of socially vulnerable groups such as women, children, the elderly, the poor, and people with disabilities, and take appropriate consideration such as to prepare mitigation measures to prevent negative impacts.

B. Project Effect

1) Quantitative effect

The improvement of irrigation facilities will enable the introduction of double cropping from conventional rain-fed agriculture and increase unit yields, which is expected to increase production volume and improve farmers' incomes. However, since there is no data on current farming conditions, farming plans based on available water resources, and data on increases in production volume (increases in profits), it is difficult to confirm or describe specific calculation details.

Regarding the number of beneficiaries, since the plan is to recruit new settler farmers for each 2 ha irrigation block, $6,600 \text{ ha} / 2 \text{ ha} = \text{maximum } 3,300 \text{ farmers}$, and multiplying this by the average number of households in rural areas nationwide of 5.42^{190} , a total of approximately 17,900 people.

2) Qualitative effect

It is expected to contribute to food security, revitalize the economy and industry of rural areas, and improve the livelihoods and incomes of producers. However, due to lack of information, it is difficult to describe a description based on concrete data.

3) Internal rate of return

The F/S report states that the EIRR is 12.3%, but the calculation method and data on which it is based are unclear, making verification difficult.

C. Prerequisites/External conditions

1) Prerequisites

The necessary land acquisition needs to be carried out appropriately and smoothly by the Nigerian government, but at present details such as the scale, location, route, etc. of the facility are unknown, and the feasibility is unclear.

When constructing irrigation facilities, the recipient government may have to pay for the construction of terminal facilities such as tertiary canals in order to reduce project costs and avoid land disputes. However, there are cases where the construction work is delayed or not carried out, impairing the project's effectiveness. Since TRIMING also uses the project costs to develop terminal facilities, it is hoped that similar measures will be taken for this project.

2) External conditions

Regarding security, it is not easy to ensure security in Nigeria and cannot be controlled, so it has to be an external condition. Therefore, as seen in “4.5.3 Utilization of Lessons Learned from Similar Works”, safe areas are selected by gathering sufficient information before site selection. It is also important to collect a wide range of risk information on a regular basis, and to create a system that allows operations to be carried out by remote control in the event of an emergency.

(2) Duku LadeArea

A. Project Summary

1) Project purpose

This project aims to improve agricultural productivity in Kwara State, north-central Nigeria, by

¹⁹⁰ Nigeria Living Standards Survey (2018/2019), NBS 2020, <https://nigerianstat.gov.ng/download/1123>

expanding irrigation facilities, procuring agricultural machinery, strengthening irrigation facility maintenance and management systems by strengthening the capacity of water users' associations, and providing farming support. This will contribute to strengthening Nigeria's food security.

However, since there is no data on farming plans based on available water resources, and no data on evaluations or water balance calculations related to dam construction, it is difficult to give a concrete description.

2) Project site

Ilorin, the capital of Kwara State, is located approximately 330 km west-southwest of the capital Abuja, and the irrigation area is approximately 150 km from Ilorin, located in Pategi LGA (population 110,000).

3) Project contents

- i) Construction and maintenance of new dams and irrigation facilities using small-scale pumps (assuming 800 ha of irrigated area for dams and 400 ha for pumps), and related agricultural infrastructure (farm roads)
- ii) Procurement and placement of agricultural machinery (tractors, etc.)
- iii) Administration building, warehouse, dormitory, etc. for irrigation area management
- iv) Consulting services (detailed design, bidding assistance, construction supervision, strengthening irrigation associations, farming support, etc.)

However, the planned location of the dam is not clear. It may also include hydroelectric power generation capabilities. Geological survey results and structural considerations are unclear, and the amount of water stored is large compared to the amount of water required for irrigation. Therefore, it is necessary to confirm these points. However, no consideration has been given to the water use plan, which is formulated by calculating the water balance based on the amount of water required based on the farming plan and the amount that can be supplied based on river flow conditions, and the scale of the facilities that will take in and distribute this water. The local situation (impact on the environment and local residents, etc.) is unclear, and confirmation and information gathering are necessary. The basis for the type and number of agricultural machinery is also unknown.

4) Total project cost

As mentioned above, the total project cost in the F/S report is N12,626 million (=JPY 2,000 million), and the amount that takes into account price increases is N16,224 million (=JPY 2,570 million). However, as in the Laminga area, there is a lot of room for fluctuation because the specific details of the estimated cost based on actual unit prices in the vicinity of the project area and estimated unit costs for major construction work are unknown, and the scale of the facility is also unclear. Multiplying the new IWMI installation cost by the irrigation planned area yields 14,455 USD/ha x 1,200 ha = USD 17.3

million = JPY 2,469 million¹⁹¹, which is close to the expected price increase above. However, considering examples of new large-scale dams in other countries, there is a risk that the project cost may be too low, and therefore needs to be scrutinized.

5) Project implementation period

The project implementation cost is estimated to be around 8 to 10 years based on similar cases in other countries, but this needs to be considered based on the scale of the dam, which is the main facility, and a general review.

6) Project implementation structure

The project implementation structure will be similar to that of the Laminga area, but the RBDA will be under the jurisdiction of the Lower Niger River Basin Development Authority (LNRBDA).

7) Collaboration and role sharing with other projects, other aid organizations, etc.

It is same as the Laminga area.

8) Environmental and Social consideration, cross-cutting issues, and Gender consideration

i) Environmental and social consideration

- a) Category classification: A
- b) Basis for category classification: This project falls under the sensitive area listed in the "Japan International Cooperation Agency Environmental and Social Consideration Guidelines" (promulgated in January 2022). In addition, this project is a Category I project (requires approval based on a full-scale EIA study; equivalent to Category A of the JICA Guidelines) listed in Nigeria's EIA Procedural Guidelines as an "the sensitive area" and "Construction of dams and man-made lakes and artificial enlargement of lakes with surface areas of 200 hectares or more."
- c) Environmental permits: In accordance with Nigeria's Environmental Impact Assessment Law and the EIA procedure guidelines based on this law, provisional approval from the Environmental Assessment Department of the Federal Ministry of Environment is required before construction work can begin. The Federal Ministry of Water Resources prepared an environmental impact assessment (EIA) report during the feasibility study, but it has not yet submitted an application for approval. In future surveys, it is necessary to improve the report so that the level and content are in line with the JICA Environmental and Social Consideration Guidelines.

¹⁹¹ JICA foreign currency exchange rate January 2024 USD 1=¥ 142.364

- d) **Pollution countermeasures:** During construction, air pollution, noise and vibration will be generated, but countermeasures can be taken such as maintenance of construction vehicles and heavy machinery, water sprinkling, installation of soundproof walls, and use of low-noise machinery. In addition, soil erosion and water pollution are expected due to excavation, but the impacts will be alleviated through the use of sedimentation ponds, silt fences, interceptors, etc. The excavated soil will be reused in the fields within the project area, and the remainder will be transported to the existing soil dump site. During operation, it is expected that there will be an impact on water quality due to the increased use of pesticides and fertilizers, but the impact will be alleviated through the formulation of a management plan for pesticides and fertilizers, and training and technical guidance on proper use by agricultural extension workers.
- e) **Natural environment:** The project area is close to the Lower Kaduna-Middle Niger Floodplain, a registered site under the Ramsar Convention, and an Important Bird Area (IBA). With the increase in cultivated land resulting from this project, the amount of pesticides and fertilizers used will increase, which is expected to have an impact on water quality, but a management plan for pesticides and fertilizers will be developed and appropriate management will be promoted. Thus the impact will be alleviated. There will be some impact on the habitats of flora and fauna in the area where the dam is planned to be constructed, but the degree of impact is expected to be low.
- f) **Social environment:** This project will involve land acquisition for the planned irrigation facility, but it is not expected that involuntary resettlement will occur. Owners of affected land and their crops will be compensated in a timely and appropriate manner. After explaining the purpose and contents of the project through consultation with residents, no particular opposition to the implementation of this project was confirmed.
- g) **Other/Monitoring:** during construction, the contractor will monitor air quality, noise/vibration, water quality, ecosystem, waste, etc. under the responsibility of the Federal Ministry of Water Resources, Once in operation, the Federal Ministry of Water Resources will monitor air quality, noise and vibration, water quality, soil, ecosystem, livelihood restoration, etc.

ii) Cross-cutting issues

Climate change countermeasures...This project is expected to help adapt to the effects of climate change by stabilizing agricultural water supply through the development of irrigation facilities.

iii) Gender considerations

Formulate irrigation facility design and construction plans from the perspective of socially vulnerable groups such as women, children, the elderly, the poor, and people with disabilities, and take appropriate consideration such as to prepare mitigation measures to prevent negative impacts.

B. Project Effect

1) Quantitative effect

The improvement of irrigation facilities will enable the introduction of double cropping from conventional rain-fed agriculture and increase unit yields, which is expected to increase production volume and improve farmers' incomes. The table below shows the planting status before and after the project, as estimated from the F/S report.

Table 4-51 Changes in cropping status before and after the project

Pre-project		
(1) Rainy Season		
Crop	Area ha	Yield kg/ha
Rice	800	2,000
Post-project		
Crop	Area ha	Yield kg/ha
(1) Rainy Season		
Rice	800	3,500
Maize	150	3,000
Sorghum	150	2,500
Cowpea	100	1,500
Sub-total	1,200	
(2) Dry Season		
Rice	800	3,500
Wheat	100	2,500
Maize	100	3,000
Onion	100	25,000
Tomato	100	40,000
Sub-total	1,200	
Total	2,400	

Source: Calculated by the Study Team from F/S report

Regarding the number of beneficiaries, according to the F/S report, the land holdings in lowland wetlands range from 0.5 to 1 ha. Therefore, assuming the average value is 0.75 ha/household, there will be 1,600 households in 1,200 ha, multiplied by the average number of households in Kwara State, 4.73¹⁹², and it can be estimated that there will be approximately 7,600 people.

2) Qualitative effect

It is expected to contribute to food security, revitalize the economy and industry of rural areas, and improve the livelihoods and incomes of producers. However, due to lack of information, it is difficult to describe on concrete data.

¹⁹² Nigeria Living Standards Survey (2018/2019), NBS 2020, <https://nigerianstat.gov.ng/download/1123>

3) Internal rate of return

The F/S report does not calculate the internal rate of return, but calculates $B/C = 1.79$ by comparing production costs and profits for annual agricultural production. On the other hand, based on the information in the report, EIRR was calculated assuming the following calculation conditions. As a result, assuming a project life of 30 years, the EIRR was 8.6%. Although the dam's function includes drinking water, the details are unclear and only agricultural benefits are expected here, so the EIRR is low. The total project cost is also not a reliable amount, so it is only a reference value, and further scrutiny is required.

The calculation method is to first calculate the economic project cost as shown in the table below. The amount in the report is the total project cost. The economic project cost is calculated by multiplying the construction cost by the following: Contingency fee 5%, soft component 2%, administrative fee 2%, estimated value added tax 7.5%, standard conversion coefficient (coefficient to correct domestic and foreign price distortion) 0.91

Table 4-52 Calculation of Economic Project Costs

Item	Cost (N)	Cost w/o tax (N)	Economic cost (N)
Construction cost	10,837,520,910	10,837,520,910	9,862,144,028
Contingency (5%)	541,876,046	541,876,046	493,107,201
Soft component (2%)	216,750,418	216,750,418	197,242,881
Overhead (2%)	216,750,418	216,750,418	197,242,881
VAT (7.5%)	812,814,068	0	0
Total	12,625,711,860	11,812,897,792	10,749,736,991

Note: Standard conversion factor=0.91

Source: Calculated by Study Team based on the F/S report

Next, the year of occurrence of economic project costs was set as shown in the table below.

Table 4-53 Year of Occurrence of Economic Project Cost

Year	%	Economic cost (N)
1	5	537,486,850
2	10	1,074,973,699
3	20	2,149,947,398
4	20	2,149,947,398
5	20	2,149,947,398
6	10	1,074,973,699
7	10	1,074,973,699
8	5	537,486,850
Total		10,749,736,991

Source: Calculated by Study Team based on the F/S report

Benefits were calculated from the cropping conditions before and after the project as shown in the table below.

Table 4-54 Changes in agricultural benefits before and after the project

Pre-project

(1) Rainy Season

Crop	Area ha	Yield kg/ha	Unit Price N/kg	Prod. Amount N
Rice	800	2,000	200	320,000,000

Post-project

Crop	Area ha	Yield kg/ha	Unit Price N/kg	Prod. Amount N

(1) Rainy Season

Rice	800	3,500	200	560,000,000
Maize	150	3,000	200	90,000,000
Sorghum	150	2,500	250	93,750,000
Cowpea	100	1,500	500	75,000,000
Sub-total	1,200			818,750,000

(2) Dry Season

Rice	800	3,500	200	560,000,000
Wheat	100	2,500	300	75,000,000
Maize	100	3,000	200	60,000,000
Onion	100	25,000	300	750,000,000
Tomato	100	40,000	200	800,000,000
Sub-total	1,200			2,245,000,000

Total	2,400			3,063,750,000

Incremental benefit

Post-project production amount - Pre-project production	2,743,750,000

Source: Calculated by Study Team based on the F/S report

The table below summarizes the above, and the EIRR is 8.6%. Project maintenance cost is 3% of the cumulative amount of project expenses incurred up to the previous year. It is assumed that, as a negative benef is the benefit of rainy season crops, and the increased agricultural benefits shown in the table above will rise to 20% in the first year, 40% in the second year, 70% in the third year, and 100% in the fourth year after construction completion.

Table 4-55 Calculation of EIRR

Y	Project cost N	O&M cost N	Total cost N	Negative benefit N	Agri. benefit N	Total benefit N	Balance N
1	537,486,850		537,486,850	-320,000,000	0	-320,000,000	-857,486,850
2	1,074,973,699	16,124,605	1,091,098,305	-320,000,000	0	-320,000,000	-1,411,098,305
3	2,149,947,398	48,373,816	2,198,321,215	-320,000,000	0	-320,000,000	-2,518,321,215
4	2,149,947,398	112,872,238	2,262,819,637	-320,000,000	0	-320,000,000	-2,582,819,637
5	2,149,947,398	177,370,660	2,327,318,058	-320,000,000	0	-320,000,000	-2,647,318,058
6	1,074,973,699	241,869,082	1,316,842,781	-320,000,000	0	-320,000,000	-1,636,842,781
7	1,074,973,699	274,118,293	1,349,091,992	-320,000,000	0	-320,000,000	-1,669,091,992
8	537,486,850	306,367,504	843,854,354	-320,000,000	0	-320,000,000	-1,163,854,354
9		322,492,110	322,492,110		548,750,000	548,750,000	226,257,890
10		322,492,110	322,492,110		1,097,500,000	1,097,500,000	775,007,890
11		322,492,110	322,492,110		1,920,625,000	1,920,625,000	1,598,132,890
12		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
13		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
14		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
15		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
16		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
17		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
18		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
19		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
20		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
21		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
22		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
23		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
24		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
25		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
26		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
27		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
28		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
29		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
30		322,492,110	322,492,110		2,743,750,000	2,743,750,000	2,421,257,890
	10,749,736,991	8,271,922,614	19,021,659,605	-2,560,000,000	55,698,125,000	53,138,125,000	34,116,465,395
EIRR=							8.6%

Source: Calculated by Study Team based on the F/S report

C. Prerequisites/External conditions

1) Prerequisites

As with the Laminga area, the necessary land acquisition needs to be carried out appropriately and smoothly by the Nigerian government, but the feasibility of this project is unclear as details such as the scale, location, route, etc. of the facility are currently unknown.

The development of terminal facilities is the same as in the Laminga area, and it is necessary to include it in the project cost to ensure that the effects are achieved.

2) External conditions

As with the Laminga area, sufficient attention must be paid to security.

4.5.8 Organizing information necessary for future consideration

As mentioned above, the F/S reports for both Areas obtained from FMWRS do not contain enough information, so it is summarized here the studies that will be needed in the future and the information needed for them. The overall work flow is organized in .

(1) Basic information survey of target area

Table 4-56 Basic information survey items

Item	Cqtegrory	Survey Contents
1) Survey of social and economic conditions in the target area	Collection of existing materials and literature research	- Administrative classification, population, land use ownership status, industrial structure, school attendance rate, health and hygiene status, household income/expenditure, ethnicity, customs, religion, security status, etc. - Collection of various maps, topographic maps, GIS data, etc.
2) Survey of existing infrastructure in the target area	Collection of existing materials and confirmation of the site situation	Location, status, manager, size structure, etc. of roads, rivers, irrigation facilities, drainage channels, power facilities, etc.
3) Survey of the current status of farming and irrigation in the target area	Collection of farming-related information	Grasping of farming status, number of farmers, production volume, etc., cultivation calendar, government/state policies, distribution structure, irrigation implementation status, extension service status, pastoral status
	Collection of irrigation related information	Government/state plans, irrigation project implementation status, operational status, local situation confirmation, planning/design standards for irrigation facilities, and information on similar projects/construction results.
4) Survey on existing project plan status, project needs, and implementation structure	Collection of existing materials and interviews with related parties	- Confirmation of the preparation of existing project plans in the target area, plan implementation status, implementation process, etc. - For research on the implementation system, see section (5) 4).
5) Survey of natural conditions in target area	Local literature survey	- Basic information on soil quality, soil temperature, humidity, precipitation, wind power, wind direction, wind speed, evapotranspiration, sunshine hours, sunshine amount, underground infiltration, flood occurrence status, soil, soil conditions, vegetation, etc. - Soil and geological survey results in nearby areas
	Geological field surveys and test pits at dam sites and borrow pits	Field reconnaissance and test pit excavation survey by soil experts, collection of soil samples
	Soil test (local subcontractor)	Test investigation of the above sample
6) Survey of water resource conditions in the target area	Local literature survey and interviews	- Inventory survey of hydrological data, precipitation, river water level, river flow rate, water quality, riverbed material, etc. - Water usage status, water usage practices, current status and maintenance status of water usage facilities - Flow rate observation data of target river - Existing water intake facilities of the target river - Maintenance flow rate - River flow survey - Groundwater level survey

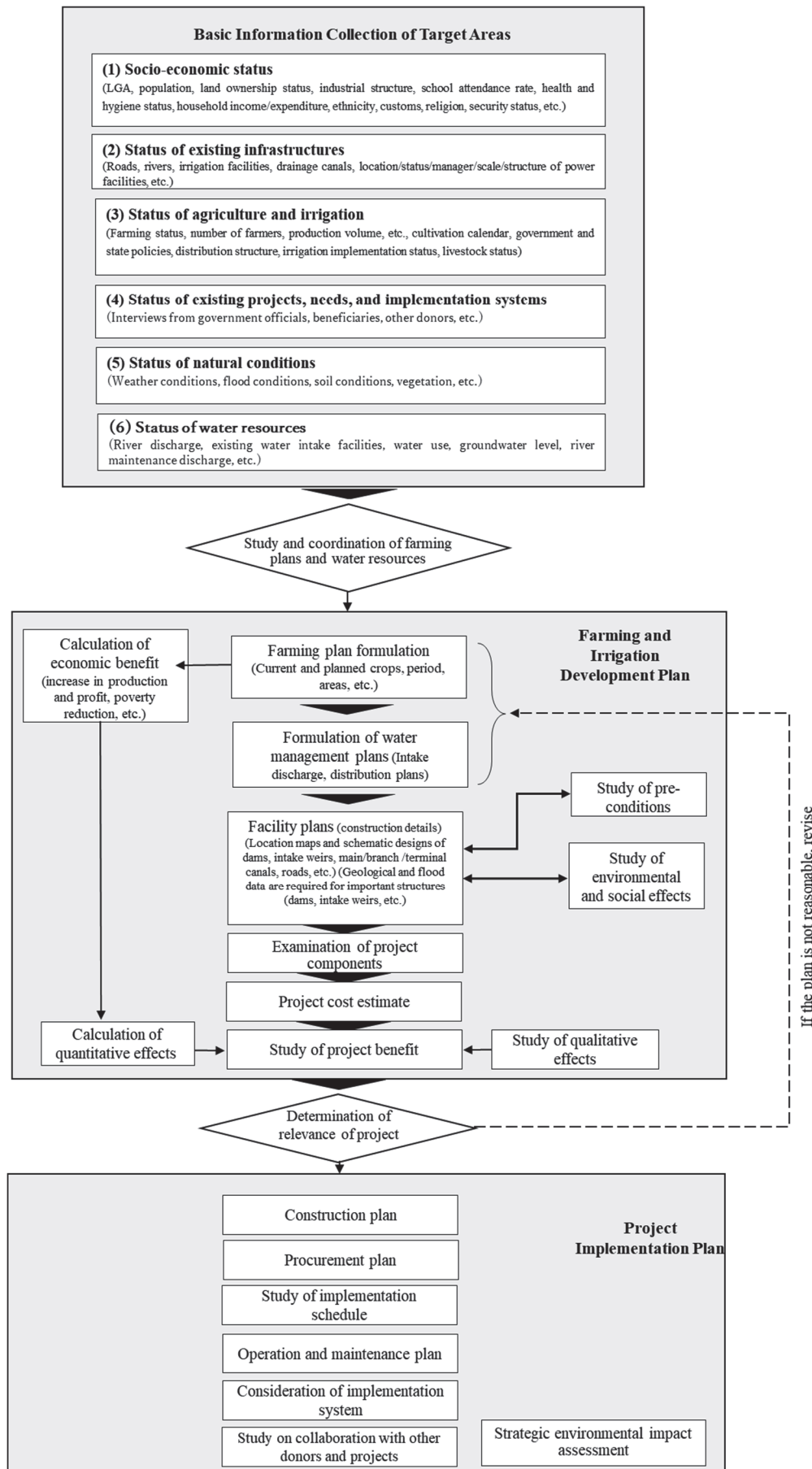


Figure 4-27 Future Necessary Study Flow

(2) Farming and irrigation development plan

Table 4-57 Survey items for farming and irrigation development plans

Item	Survey Contents													
1) Setting basic development policy	Development policy and project planning conditions are set based on existing F/S materials, locally collected information, JICA support policy, etc.													
2) Establishment of target area boundaries, etc.	Based on the field survey, clarify the boundaries, areas, and beneficiaries of the project.													
3) Formulation of farming plan	Based on the basic development policy and the basic information survey results mentioned above, create a farming plan for the target area, set the target area, cropping plan, farming support plan, post-harvest processing plan, farming income and expenditure plan, cultivation calendar, etc. , clarify the difference between the current situation and the plan.													
4) Formulation of water usage plan	Based on the above farming plan and local conditions, it will be calculated the required amount of water and created a water source and water supply/distribution plan. (Related matters are also listed in the table below)													
5) Facility planning	The outline of each component of the basic plan will be examined based on the collected secondary materials and visual confirmation through site reconnaissance. Several alternative plans will be set for the specifications and contents of the facility, and compared and examined from the viewpoints of cost, environmental and social considerations, ease of maintenance, etc. Note that design based on surveying will not be conducted in this study.													
	<table><tr><th>Item</th><th>Factors to consider</th><th>Items to decide</th></tr><tr><td rowspan="3">Irrigation</td><td> • Various basic investigations • Unit water consumption, current usage amount </td><td>Water shortage and water intake Planned water volume, planned water level, planned water storage amount</td></tr><tr><td> • River flow conditions, water source potential, topography and geology of the planned facility construction site • Planned water intake amount, planned water intake level </td><td>Scale and structure of water intake facilities such as headworks and pump stations</td></tr><tr><td> • Type of water source, topographical survey/land acquisition status • Planned water volume (divided water volume) and planned water level at each water diversion point based on the irrigation plan • Route layout from water intake point to farmland • Planned water flow and planned water level for each water facility </td><td>Scale (extension and planned cross section) and structure of agricultural canals, diversion works, regulating ponds, pipelines, waterway tunnels, etc. Scale (length and planned flow rate) and structure of agricultural canals, diversion works, drop works, regulating ponds, etc.</td></tr><tr><td>Accessory farm road</td><td> • Contribution to and maintenance management of agricultural production and distribution activities • Competent ministries and agencies (if roads outside the jurisdiction of the FMWRS are also considered, the implementation structure should be considered) </td><td> • Various information necessary for design • Implementation and maintenance management system for this project </td></tr></table>	Item	Factors to consider	Items to decide	Irrigation	• Various basic investigations • Unit water consumption, current usage amount	Water shortage and water intake Planned water volume, planned water level, planned water storage amount	• River flow conditions, water source potential, topography and geology of the planned facility construction site • Planned water intake amount, planned water intake level	Scale and structure of water intake facilities such as headworks and pump stations	• Type of water source, topographical survey/land acquisition status • Planned water volume (divided water volume) and planned water level at each water diversion point based on the irrigation plan • Route layout from water intake point to farmland • Planned water flow and planned water level for each water facility	Scale (extension and planned cross section) and structure of agricultural canals, diversion works, regulating ponds, pipelines, waterway tunnels, etc. Scale (length and planned flow rate) and structure of agricultural canals, diversion works, drop works, regulating ponds, etc.	Accessory farm road	• Contribution to and maintenance management of agricultural production and distribution activities • Competent ministries and agencies (if roads outside the jurisdiction of the FMWRS are also considered, the implementation structure should be considered)	• Various information necessary for design • Implementation and maintenance management system for this project
	Item	Factors to consider	Items to decide											
	Irrigation	• Various basic investigations • Unit water consumption, current usage amount	Water shortage and water intake Planned water volume, planned water level, planned water storage amount											
		• River flow conditions, water source potential, topography and geology of the planned facility construction site • Planned water intake amount, planned water intake level	Scale and structure of water intake facilities such as headworks and pump stations											
• Type of water source, topographical survey/land acquisition status • Planned water volume (divided water volume) and planned water level at each water diversion point based on the irrigation plan • Route layout from water intake point to farmland • Planned water flow and planned water level for each water facility		Scale (extension and planned cross section) and structure of agricultural canals, diversion works, regulating ponds, pipelines, waterway tunnels, etc. Scale (length and planned flow rate) and structure of agricultural canals, diversion works, drop works, regulating ponds, etc.												
Accessory farm road	• Contribution to and maintenance management of agricultural production and distribution activities • Competent ministries and agencies (if roads outside the jurisdiction of the FMWRS are also considered, the implementation structure should be considered)	• Various information necessary for design • Implementation and maintenance management system for this project												
6) Consideration of project components	♦ Examination of soft components related to farming, facility maintenance and management, capacity building of irrigation associations, etc. ♦ Consideration of consultant service content													
7) Consideration	Concerning branch canals after tertiary canals, facility development at the terminal field													

of project prerequisites	level, etc., it will be confirmed the mismatch with the work borne by the recipient government, as well as examples from other donors.

(3) Consideration of project costs

- ♦ When estimating the approximate project cost, basically divide it into the following items. This report will include a total list of project costs, and will not include specific individual cost estimation results. The accuracy of the estimation is based on a design without actual surveying.
 - a) Main project cost
 - b) Price escalation regarding main project costs
 - c) Contingency funds related to main project costs
 - d) Interest rate during construction
 - e) Front end fee
 - f) Consultant fee (including price escalation and contingency)
 - g) Others 1: (Items not eligible for financing) Land compensation, etc., customs duties, taxes, general administrative expenses of the project proponent
 - h) Other 2: Contracted maintenance costs after completion, initial working capital, training/training costs, and public relations/management costs additionally required for the implementation of the project.
- ♦ Projects should be submitted in the format of the cost calculation support system (Excel file) provided by JICA.
- ♦ It will be obtained project costs, etc. for similar projects implemented by other donors, etc., and created donor comparison materials (no specified format) for project costs, etc.

(4) Consideration of business effects

Regarding the yen loan component, the project will be evaluated by classifying it into 1) quantitative effects and 2) qualitative effects, and quantitative indicators will be set as much as possible for quantitative effects. Furthermore, target values for the target year will be set approximately three years after project completion. In addition, the number of beneficiaries and internal rate of return (EIRR) will be calculated as quantitative indicators. The rate of return is an estimate based on the estimated project costs above. If baseline values for quantitative indicators do not exist, it is assumed that they will be collected during the preparatory survey for individual projects after this survey.

(5) Project implementation plan

Table 4-58 Items to consider in the project implementation plan

Item	Survey Contents
1) Construction plan	It will be formulated a construction plan based on labor conditions, labor-related laws and regulations, meteorological and hydrological conditions, topographical conditions of the planned construction site, and various procedures (business permits, etc.) necessary for implementing this project.
2) Procurement plan	It will be proposed a procurement method that will enable efficient implementation of the project, taking into full consideration the current state of labor in the target area, procurement circumstances for materials and equipment, domestic laws, and various conditions related

	to yen loan procurement.
3) Consideration of project schedule	A monthly bar chart will be created for the construction period including procurement procedures.
4) Operation and maintenance plan	It will be considered how the maintenance and management system should be after the implementation of the Yen loan project. Specifically, it will be considered the following items and organize matters to keep in mind. • Confirmation of maintenance and management system • Confirmation of the maintenance and management organization's duties, organizational structure, and personnel structure (including legal position) • Finance/budget status of maintenance and management organizations • Technical level of maintenance and management organization • Achievements of maintenance and management organizations • If residents will maintain and manage facilities through an water user's association in addition to the implementing agency, consider not only the implementing agency's financial plan but also the income and expenditure of the water user's association and incorporate them into the plan.
5) Consideration of project implementation structure	The implementation structure for this project will be considered after understanding the structure and implementation capacity of other JICA projects and other donor projects implemented by the FMWRS. Specifically, the following items will be considered and matters will be organized to keep in mind. 1) Confirmation of project implementation structure (establishment of PMU: Project Management Unit, etc.) 2) Confirmation of the implementing agency's duties, organizational structure, and personnel structure (including legal position) 3) Financial/budget status of the implementing agency 4) Technical level of the executing agency 5) Experience of the implementing agency in implementing similar projects 6) Coordination mechanism for project implementation among related ministries and departments
6) Consider collaboration with other donors and other projects	It will be conducted interviews with major donors such as the World Bank, AfDB, IFAD, and FAO, as well as related organizations such as NGOs, with the aim of forming a project that organizes the division of roles and collaboration.
7) Consideration of design and construction supervision plan for consulting	It will be Proposed an outline of support (objectives, TOR draft, and personnel plan) by a project management consultant. At that time, the division of support that should be provided through consulting services and support that should be provided through technical assistance will be sorted out.

(6) Consideration of strategic environmental impact assessment

Environmental impact assessments will be conducted at the IEE level based on the concept of strategic environmental assessment.

- 1) Consideration of objectives and goals of policies, plans, etc.
- 2) Examination of alternative plans to achieve the objective within various constraints
- 3) Examining the contents of policies and plans (development forecasts, list of measures, maps of routes and future development areas, etc.)
- 4) Scoping (clarifying important environmental and social consideration items and evaluation methods when selecting projects for F/S)
- 5) Confirmation of baseline environmental and social conditions (land use, natural environment, living areas of indigenous peoples, economic and social conditions, etc.)
- 6) Confirmation of the environmental and social consideration system and organization of the

partner country

- i) Laws and standards related to environmental and social considerations (environmental impact assessment, resident relocation, resident participation, information disclosure, etc.)
 - ii) Deviation from “Japan International Cooperation Agency Environmental and Social Consideration Guidelines” (January 2022)
 - iii) Role of related organizations
- 7) Impact prediction
 - 8) Impact assessment and comparative study of alternatives (including zero option)
 - 9) Considering mitigation measures (avoidance, minimization, compensation)
 - 10) Consideration of monitoring methods
 - 11) Preparation of scoping results of environmental and social consideration items for the F/S target project (alternatives to be considered, range of environmental and social impact items considered to be important, and prediction/evaluation method proposals)
 - 12) Support for holding stakeholder consultations (purpose of implementation, participants, contents of consultations, etc.)

(7) Outline of the next survey work (reference)

1) Purpose

At the stage of the next survey work, it will be reviewed and confirmed the general situation of the priority areas selected in the previous work, taking into account the latest economic and social situation, security situation, etc. After that, it will be collected and organized the relevant information necessary to proceed with the preparatory survey for the project loan project.

2) Approximate amount of work

Total 18 P/M

However, although all the necessary items are listed in the survey items (1) to (6) above, it will be utilized the items confirmed in the previous information collection/confirmation survey, and the expenses will not be included.

3) Composition of workers (draft)

- i) Summary/Irrigation development
- ii) Irrigation facility plan
- iii) Farming support
- iv) Soil quality (dam planning)
- v) Design and cost estimation
- vi) Economic/financial analysis
- vii) Environmental and social considerations

4) Subcontracting

- Soil investigation/testing

5) Necessary equipment

- Highly accurate ground elevation DEM data

*In the next survey stage, no surveying will be conducted, but it is envisaged that DEM data will be used to examine the location of water intake facilities, the route of headrace channels, etc.

6) Implementation period

The entire work period is expected to be approximately 10 months.

Month \ Work	1	2	3	4	5	6	7	8	9	10	Remarks
Domestic preparation work	■	■	■	■	■	■	■	■	■	■	
First field work	■	■	■	■	■	■	■	■	■	■	
Somestic planning & design work	■	■	■	■	■	■	■	■	■	■	
Second field work	■	■	■	■	■	■	■	■	■	■	
Domestic work	■	■	■	■	■	■	■	■	■	■	
Organuzing work	■	■	■	■	■	■	■	■	■	■	