

**Africa**

**Data Collection Survey on Food Value  
Chain Development for Food Security  
and Nutrition Improvement in  
Sub-Saharan Africa**

**FINAL REPORT**

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## Table of Abbreviations

Abbreviation	English
3PA	3-Pronged Approach
A/P	Action Plan
ABF	Antibiotics Free poultry
ACET	Africa Center for Economic Transformation
ACT	Agriculture Council of Tanzania
AD2M2	Project to Support Development in the Menabe and Melaky Regions Phase II
ADAZ	Aquaculture Development Association of Zambia
ADC	Agricultural Development Corporation
ADP	Agricultural Development Programme
AfDB	African Development Bank
AGRA	Alliance for Green Revolution in Africa
AIC	Agriculture Incubation Center
AIRC	Agricultural Information Resource Centre
AMCOS	Agricultural Marketing Co-operative Societies
APMEP	The Agricultural Productivity and Market Enhancement Project
APP	Agricultural Promotion Policy
APPEALS	Agro-Processing, Productivity Enhancement and Livelihood Improvement Support Project
APPSA	Agricultural Productivity Program for Southern Africa
ARAP	Abbreviated Resettlement Action Plan
AROPA	Projet d'Appui au Renforcement des Organisations Professionnelles et aux services Agricoles
ASA	Agricultural Seed Agency
ASAL	Arid and Semi-Arid Lands
ASDP II	Agricultural Sector Development Programme Phase II

ASDS	Agricultural Sector Development Strategy
ASTGS	Agricultural Sector Transformation and Growth Strategy
BRC	British Retail Consortium
BSCI	Business Social Compliance Initiative
BVPI	Bassins Versants et Périmètres Irrigués
CADP	Nigeria Commercial Agriculture Development Project
CAN	Calcium Ammonium Nitrate
CAN	Cacao Association of Nigeria
CAP	Chapter
CASEF	Madagascar Agriculture Rural Growth and Land Management Project
CASP	Climate Change Adaptation and Agribusiness Support Program in the Savanna Belt
CBPP	Community-Based Participatory Planning
Cbsp	Community Based Seed Production
CCECC	China Civil Engineering Construction Corporation
CEED	Center for Environmental Education and Development
CEO	Chief Executive Officer
CFAN	Cocoa Farmers Association of Nigeria
CGIAR	Consultative Group for International Agricultural Research
CIAT	International Centre for Tropical Agriculture
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNC	Le Conseil National du Cacao
COBA	Community Based Organization for the Forest Protection
COD	Cut Off Date
COE	Centre of Excellence
COMACO	Community Market for Conservation

COMESA	Common Market for Eastern and Southern Africa
CPR	Cadre de Politique de Reinstallation
CREC	China Railways Engineering Cooperation
CRIN	Cocoa Research Institute of Nigeria
CRP	Compensation and Resettlement Plan
CRSG	China Railways Seventh Group
CSO	Central Statistical Office
CTC	Crush, Tear, Curl
CTE	Comite Technique d'Evaluation
CTHT	Centre Technique Horticole de Tamatave
CVC	Commodity Value Chain
CVP	Core Venture Plot
DACO	District Agriculture Coordinator
DANIDA	Danish International Development Agency
DAP	Di-Ammonium Phosphate
DBST	Double Bituminous Surface Treatment
DCC	Development Coordinating Committee
DDCC	District Development Coordinating Committee
DDI	Domestic Direct Investment
DEFIS	Inclusive Agricultural Value Chains Development Programme
DFID	Department for International Development
DFR	Draft Final Report
DHS	Demographic and Health Surveys
DoE	Department of Environment
DPs	Development Partners

DUS	Distinctness, Uniformity and Stability
DWRD	Department of Water Resources Development
EAC	East African Community
EAFA	Eastern Africa Farmer's Federation
E-COBSI	Expansion of Community-Based Smallholder Irrigation Development Project
ECOWAS	Economic Community of West African States
EDBM	Economic Development Board of Madagascar
EDP	Export Development Program
EIA	Environmental Impact Assessment
EIE	Etude d'Impact Environnemental
EIS	Environmental Impact Statement
EIT	Entreprises Industrielles de Transformation
EMA	Environmental Management Act
EMCA	Environmental Management and Coordination Act
EOS	Ecocert Organic Standard
EPB	Environmental Project Briefs
EPIB	Entreprises de Production Intensive Basique
EPZ	Export Processing Zone
EPZA	Export Processing Zone Authority
ERA	Environmental Rights Action
ES	Entreprises de Services
E-SAPP	Enhanced Smallholder Agribusiness Promotion Programme
ESC	Environmental and Social Considerations
ESIA	Environmental and Social Impact Assessment
EU	European Union

EUR	Euro
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agriculture Organization Corporate Statistics Database
FAPA	Fund for African Private Sector Assistance
FB	Farm Block
FBDP	Farm Block Development Programme
FCC	The Federation of Cocoa Commerce
FCS	Food Consumption Score
FDI	Foreign Direct Investment
FISP	Farmer Input Support Programme
FMARD	Federal Ministry of Agriculture and Rural Development
FMITI	Federal Ministry of Industry, Trade and Investment
FMST	Federal Ministry of Science and Technology
FMT	Federal Ministry of Transport
FOB	Free on Board
FoEN	Friends of the Earth Nigeria
FORMAPROD	Vocational Training and Agricultural Productivity Improvement Programme
FRA	Food Reserve Agency
FS	Feasibility Study
FtMA	Farm to Market Alliance
FTMM	Feed the Future -Tanzania Mboga na Matunda
FVC	Food Value Chain
GAIN	The Global Alliance for Improved Nutrition
GBP	Pound Sterling
GDP	Gross Domestic Product

GED	Groupe Europeen de Development
GEMS-4	Growth and Employment in States 4
GES	Growth Enhancement Support
GHG	Green House Gases
GHP	Good Handling Practices
GIS	Geographic Information System
GJN	Global Justice Now
GM	Genetically Modified
GMA	Game Management Area
GPS	Global Positioning System
GRZ	Government of Republic of Zambia
HACCP	Hazard Analysis and Critical Control Points
HRW	Human Right Watch
HS code	Harmonized System code
IAPRI	Indaba Agricultural Policy Research Institute
ICA	Integrated Context Analysis
ICCO	International Cocoa Organization
ICSID	International Centre for Settlement of Investment Disputes
ICT	Information and Communication Technology
ICTA	Information and Communication Technology Authority
IDA	International Development Association
IDBI	Industrial Development Bank of India
IDC	Industrial Development Corporation
IEE	Initial Environmental Examination
IFAD	International Fund for Agricultural Development



IFNA	Initiative for Food and Nutrition Security in Africa
IFS	International Featured Standards
IITA	International Institute of Tropical Agriculture
INC	International Nut and Dried Fruit Council
IPM	Integrated Pest Management
ISO	International Organization for Standardization
ISPM	International Standards for Phytosanitary Measures
ISSP	Improving Smallholder Productivity and Profitability Project
IUCN	International Union for Conservation of Nature
IWUA	Irrigation Water Users Association
JETRO	Japan External Trade Organization
JFFLS	Junior Farmer Field Life School
JICA	Japan International Cooperation Agency
JiPFA	JICA Platform for Food and Agriculture
JV	Joint Venture
KALRO	Kenya Agricultural and Livestock Research Organization
KAVES	Kenya Agriculture Value Chain Enterprises
KCCL	Kennie-O Cold Chain Logistics
KCDMS	Kenya Crops and Dairy Market Systems
KDHS	Kenya Demographic and Health Survey
KEPHIS	Kenya Plant Health Inspectorate Service
KES	Kenyan Shilling
KESIMS	Kenya E-Subsidy Input Management System
KFBDC	Kalungwichi Farm Block Development Corporation
KIA	Kenya Investment Authority

KLA	Kenya Land Alliance
KMT	Kenya Market Trust
KPI	Key Performance Indicators
LBA	Licensed Buying Agents
LGA	Local Government Area
LHO	Land Husbandry Officer
LIFE-ND	Livelihood Improvement Family Enterprises Project in the Niger Delta of Nigeria
LINKS	LINKS-Powering Economic Growth in Northern Nigeria
M&E	Monitoring and Evaluation
M/P	Master Plan
MADE	Market Development in the Niger Delta II
MBNP	Ministry of Budget and National Planning
MDD-W	Minimum Diet Diversity for Women
MDM	Mechanically separated meat
MECIE	Mise en Compatibilité des Investissements avec l'Environnement
MGA	Malagasy Ariary
MGF	Matching Grant Funds
MICS	Multiple Indicator Cluster Surveys
MIGA	Multilateral Investment Guarantees Agency
MO	Market Operator
MOA	Ministry of Agriculture
MoCTA	Ministry of Chiefs and Traditional Affairs
MoG	Ministry of Gender
MoLF	Ministry of Livestock and Fisheries
MoLGH	Ministry of Local Government and Housing

MoLNR	Ministry of Land and Natural Resources
MoMEWD	Ministry of Mines, Energy and Water Development
MOP	Muriate of Potash
MOU	Memorandum Of Understanding
MoWDSEP	Ministry of Water Development, Sanitation and Environmental Protection
MP	Member of Parliament
MPITI	Master Plan for Integrated Transportation Infrastructure
MRL	Maximum Residue Levels
NADP	National Aquaculture Development Plan
NADS	National Aquaculture Development Strategy
NAIP	National Agricultural Investment Plan
NAP	National Agricultural Plan
NARIGP	National Agricultural and Rural Inclusive Growth Project
NBSAP	National Biodiversity Strategy and Action Plan
NCPZ	Nigerian Federal Ministry of Agriculture and Rural Development's Staple Crop Processing
NCRI	National Cereal Research Institute
NDCC	National Development Coordinating Committee
NDHS	Nigeria Demographic and Health Survey
NDP	National Development Plan
NELMP	National Employment and Labour Market Policy
NEMA	National Environment Management Authority of Kenya
NEMC	National Environment Management Council
NEP	National Environmental Policy
NFNC	National Food and Nutrition Commission of Zambia
NFP	National Forestry Policy

NGN	Nigerian Naira
NGO	Non Governmental Organization
NIC	National Investment Commission
NiCOP	Nigeria Competitiveness Project
NIIMP	National Integrated Infrastructure Master Plan
NIPC	Nigeria Investment Promotion Commission
NJPPP	Nutrition Japan Public Private Platform
NLC	National Land Commission
NLP	National Land Policy
NMC	National Milling Corporation
NOE	National Office for the Environment
NORAD	Norwegian Agency for Development Cooperation
NPCC	National Climate Change Policy
NPE	National Policy on Environment
NPK	Nitrogen, Phosphorus, Potassium
NPT	National Performance Trial
NPT-TC	National Performance Trial Technical Committee
NRC	National Registration Card
NRMP	Natural Resource Management Project
NRP	National Resettlement Policy
NVRC	National Variety Release Committee
ODA	Official Development Assistance
OHS	Occupational Health and Safety
ONE	Office National pour l'Environnement
OSFC	One Stop Facility Centre

OSIP	One Stop Investment Centre
OTACCWA	Organization for Technology Advancement of Cold Chain in West Africa
OVP	Office of Vice President
PA	Protected Area
PACO	Provincial Agriculture Coordinating Office
PACRA	Patents and Company Registration Office
PAH	Project Affected Household
PAP	Project Affected Person
PASS	Private Agricultural Sector Support
PDCC	Provincial Development Coordinating Committee
PFC	Protein Fat Carbohydrate
PNC	Plan National Cacao
POS	Point Of Sale
PoU	Prevalence of Undernourishment
PPP	Private Public Partnership
PRAI	Principles for Responsible Agriculture Investment
PREE	Programme d'Engagement Environnementa
PROSPERER	Support Programme for Rural Microenterprise Poles and Regional Economies
QDS	Quality Declared Seed
RAP	Resettlement Action Plan
RDA	Road Development Authority
REA	Rural Electrification Authority
ReSAKSS	Regional Strategic Analysis and Knowledge Support System
RHC	Rural Health Centers
RME	Rural Medium Enterprise

RoW	Right of Way
RPF	Resettlement Policy Framework
RPN	Revenus Pour la Nature
RTC	Rural Transformation Centre
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SAO	Senior Agricultural Officer
SAPZs	Special Agro Industrial Processing Zones
SC	Selection Committee
SCPZs	Staple Crops Processing Zones
SDGs	Sustainable Development Goals
SEA	Strategic Environmental Assessment
SFMT	Sehatra Fiaraha-Mihary Tsaramaso
SGR	Standard Gauge Railway
SHA	Self Help Africa
SHEP	Smallholder Horticulture Empowerment and Promotion
SI	Statutory Instrument
SIVAP	Small-scale Irrigation and Value Addition Project
SLHO	Senior Land Husbandry Officer
SLP	Seasonal Livelihood Programming
SMS	Short Message Service
SP	Service Provider
SSA	Sub-Saharan Africa
STEP	Special Terms for Economic Partnership
SUA	Sokoine University of Agriculture
SWOT	Strengths, Weaknesses, Opportunities, Threats

TADB	Tanzania Agriculture Development Bank
TAHA	Tanzania Horticultural Association
TARI	Tanzania Agricultural Research Institute
TBI	Tariff Based Incentives
TBS	Tanzania Bureau of Standard
TBZ	Tobacco Board of Zambia
TCFBDP	Technical Committee on FB Development Program
TCP	Technical Cooperation Programme
TDHS-MIS	Tanzania Demographic and Health Survey and Malaria Indicator Survey
TEU	Twenty-foot Equivalent Unit
TGCCP	Tenure and Global Climate Change Project
TIC	Tanzania Investment Centre
TICAD	Tokyo International Conference on African Development
TIN	Taxpayer Identification Number
ToR	Terms of Reference
TOSCI	Tanzania Official Seed Certification Institute
TPRI	Tropical Pesticides Research Institute
TSB	Technical Service Branch of MoA at district
TSC	Technical Sub-Committee
TZS	Tanzanian Shilling
UAE	United Arab Emirates
UCLS	Union de Cooperatives Lazan'ny Sambirano
UN comtrade	United Nations Commodity Trade Statistics Database
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification

UNCTAD	United Nations Conference on Trade and Development
UNEP-WCMC	UN Environment Programme World Conservation Monitoring Centre
UNFCCC	United Nations Framework Convention on Climate Change
UPOV	International Union for the Protection of New Varieties of Plants
USAID	United States Agency for International Development
USD	United States Dollar
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USIP	Upscaling Smallholder Irrigation Project
USSD	Unstructured Supplementary Service Data
VAT	Value-Added Tax
VC	Value Chain
VCA	Value Chain Approach
VCDP	Value Chain Development Programme
VCF	Venture Capital Funds
VCU	Value for Cultivation and Use
VSA	Vanilla Strategic Alliance
WARMA	Water Resources Management Authority
WB	World Bank
WCF	World Cocoa Foundation
WDPA	World Database on Protected Areas
WEF	World Economic Forum
WFP	United Nations World Food Programme
WG	Working Group
WHO	World Health Organization



WRMA	Water Resource Management Authority
WRS	Warehouse Receipt System
YEAP	Youth Employment in Agriculture Programme
ZABS	Zambia Bureau of Standards
ZACCI	Zambia Chamber of Commerce and Industry
ZACOSO	Zambian Aquaculture Co-operative Society Ltd
ZAEDP	Zambia Aquaculture Enterprise Development Project
ZARI	Zambia Agriculture Research Institute
ZAWA	Zambia Wildlife Authority
ZDA	Zambia Development Agency
ZDHS	Zambia Demographic and Health Survey
ZEMA	Zambia Environmental Management Agency
ZEMA	Zambia Environment Management Authority
ZESCO	Zambia Electricity Supply Corporation
ZF	Zones Franches
ZICTA	Zambia Information and Communication Technology Authority
ZMK	Zambian Kwacha
ZNFU	Zambia National Farmers' Union
ZRA	Zambia Revenue Authority

\*All pictures without sources were taken by the survey team.



# Chapter 1. Outline of the survey



## **Chapter 1. Outline of the survey**

### **1.1. Background of the survey**

Food security and nutrition improvement is Goal 2 of the Sustainable Development Goals (SDGs) set by the United Nations (UN). The number of undernourished people in Africa surpassed 256 million in 2017, and undernourishment is worsening in most African countries. The number of undernourished people has continuously increased for the last three years, and around 40% of all chronically undernourished children, numbering 59 million, live in Africa. The world's ability to achieve Goal 2 of the SDGs by 2030 is under threat.

In alignment with the UN Decade of Action on Nutrition 2016-2025, the Japan International Cooperation Agency (JICA) launched the Initiative for Food and Nutrition Security in Africa (IFNA) at the Sixth Tokyo International Conference on African Development (TICAD) in 2016. IFNA's project formulation processes are in progress, with participating countries<sup>1</sup> aiming to increase the impact of multi-sectoral nutrition improvement activities through effective interventions in the agricultural sector.

The agricultural sector, including food production, distribution, marketing, processing, and the related industries, forms the basis of the regional economy in Africa. Increasing overall profitability by improving agricultural profitability and developing the food value chain (FVC) is greatly effective in accelerating economic growth and industrial diversification. Taking a nutrition-improvement perspective in developing the FVC is expected to contribute to food safety, and nutrition in Africa is expected to improve.

A public-private partnership (PPP) is established in the TICAD process for Japan's cooperation in Africa's agricultural sector to improve its productivity and profitability. Thus, it is necessary to consider PPP projects based on the trends and goals of Japanese companies' business development in Africa. Given these circumstances, the JICA assigned a consortium consisting of Kaihatsu Management Consulting Inc. and NTC International Co., Ltd. to the Data Collection Survey on Food Value Chain Development for Food Security and Nutrition Improvement in Sub-Saharan Africa (henceforth, the survey) in March 2019.

### **1.2. Objectives of the survey**

As the survey aims to establish an FVC that can contribute to food safety and nutrition improvement, information is collected in areas of sub-Saharan Africa (SSA) with high FVC development potential. Based on the information collected, the Survey Team identified bottlenecks, compiles future directions, and designed FVC development support projects in view of the possibility of collaborating with private companies.

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<sup>1</sup> Burkina Faso, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mozambique, Nigeria, Senegal, and Sudan.

### **1.3. Methodology**

#### 1.3.1. Timing and flow of the survey

The survey has been conducted since March 2019. The survey was closed, and its final report was submitted to JICA in October 2020. The workflow during this period is shown in Figure 1-1.

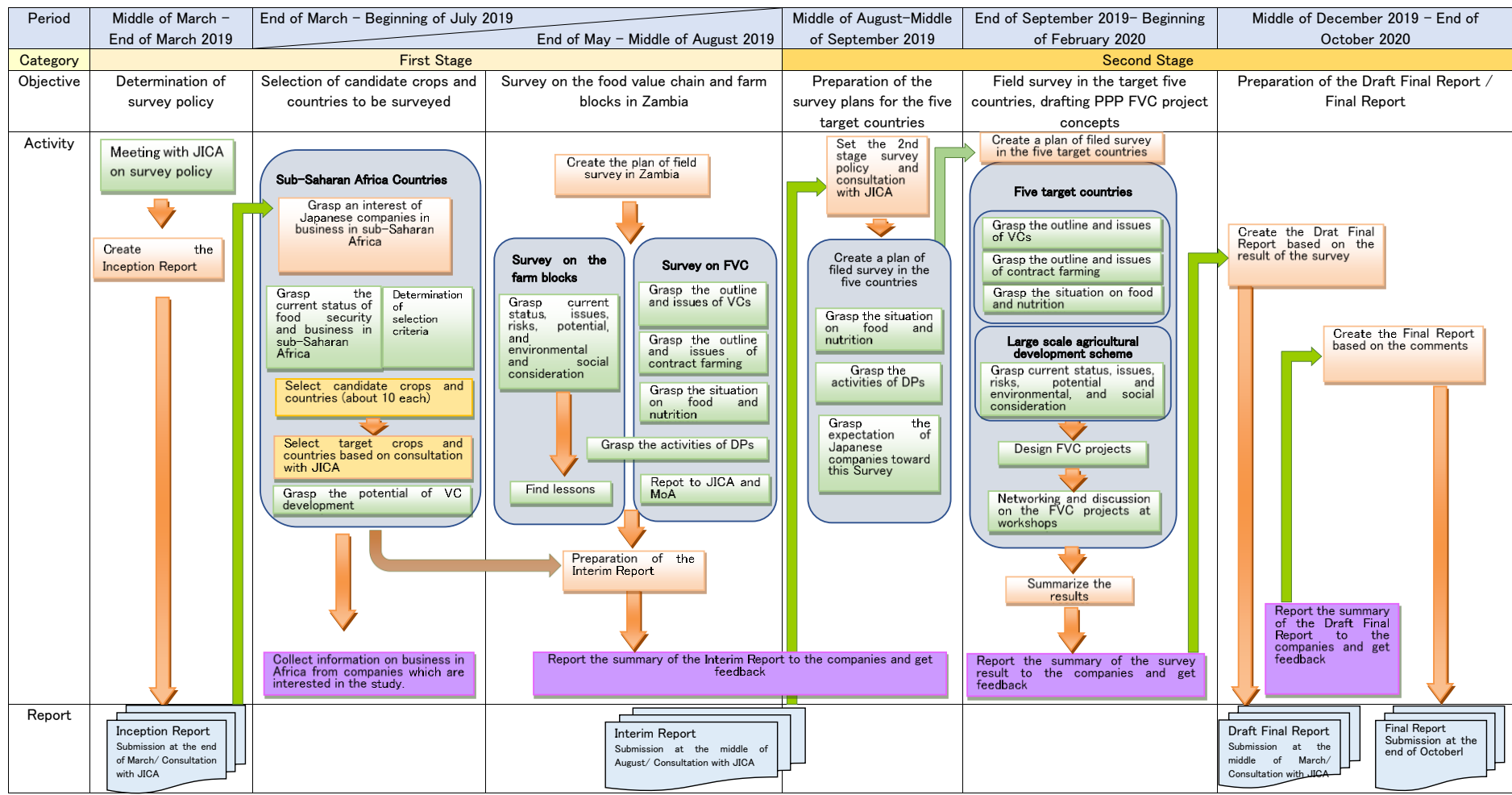


Figure 1-1: Workflow chart

Source: The Survey Team

### 1.3.2. Survey Team

The members of the Survey Team are listed in Table 1-1.

**Table 1-1: Composition of the Survey Team**

Position	Name	Company
Team Leader/ Food Value Chain	Kenichi Machida	Kaihatsu Management Consulting Inc.
Sub-Leader/ Farming and Agricultural Production	Takashi Kotegawa	NTC International Co., Ltd.
Regional Agricultural Development	Yukio Ikeda	Kaihatsu Management Consulting Inc.
Food Security and Nutrition (1)	Kazuko Shirai	Kaihatsu Management Consulting Inc.
Food Security and Nutrition (2)	Hiroki Kajifusa	Kaihatsu Management Consulting Inc.
Development Partnership (Public-Private Partnership and Aid Coordination)	Takuto Hashimoto	Kaihatsu Management Consulting Inc.
Environmental and Social Considerations/Responsible Agricultural Investment	Kenji Nakamura	NTC International Co., Ltd.

### 1.3.3. Methodology

The Survey Team collected information using the following methods and then analyzed the information to develop the final report of the survey.

#### (1) Desk study

The Survey Team conducted mainly web-based research to collect information about the current food and nutrition situations in sub-Saharan countries, Japanese companies' work in the food and agricultural sector in sub-Saharan countries, the development potential of target crops in the target countries (to be described in Chapter 2), and so on.

#### (2) Information exchange with Japanese companies and other organizations

The Survey Team collected information on crops in the sub-Saharan countries in which Japanese companies have an interest as well as information on the countries themselves. The team also exchanged information with organizations that conduct agricultural research and development in sub-Saharan countries on the development potential of specific crops and countries.

#### (3) Selection of target countries and crops

Based on the results of the desk study and the information exchange, five target countries and three target crops in each country were selected.

#### (4) Field surveys



The Survey Team conducted field surveys on the value chains (VCs) of the target crops in the target countries selected through this methodology as well as on farm blocks in Zambia.



## Chapter 2. Selection of Target Countries and Crops for the Survey



## Chapter 2. Selection of Target Countries and Crops for the Survey

### 2.1. Selection Process for Target Countries and Crops

Figure 2-1 depicts the selection process for the target countries and crops. First, countries associated with high security risk are excluded. Next, as this survey's aim is formulating FVC development projects (in the form of PPPs) to improve nutrition conditions and food security in sub-Saharan African countries, five target countries are selected based on their development needs (i.e., food security and nutrition) and Japanese firms' interest levels.

Next, two or three target crops are chosen for each of the selected target countries. The target crop selection is determined by 1) Japanese firms' interest levels and 2) the target crops of other existing or planned JICA surveys (i.e., such crops are deprioritized).



**Figure 2-1: Selection process of target countries and crops**

Source: The Survey Team

### 2.2. Selection of Target Countries

#### 2.2.1. Food Security and Nutrition

Table 2-1 shows the major nutrition indicators of sub-Saharan Africa along with comparisons with North Africa and the world. The table shows that prevalence of undernourishment and that of stunting under five years old are both quite high in sub-Saharan Africa relative to the corresponding world averages. The prevalence of anemia among women of reproductive age is also relatively high in sub-Saharan Africa. Conversely, the prevalence of wasting is relatively low in sub-Saharan Africa, meaning that wasting does not appear to be a serious issue.

**Table 2-1: Major nutrition-related indicators for sub-Saharan Africa<sup>1</sup>**

	Prevalence of undernourishment (2017)		Prevalence of stunting under five years old (2017)		Prevalence of wasting (2017)		Prevalence of anemia among women of reproductive age (2016)
	Ratio (%)	Number of people (million)	Ratio (%)	Number of people (million)	Ratio (%)	Number of people (million)	Ratio (%)
World	10.9	820.8	22.2	150.8	7.5	50.5	32.0
Africa	20.4	256.5	30.3	58.7	7.1	13.8	38.5
North Africa	8.5	20.0	17.3	5.0	8.1	2.3	32.2

<sup>1</sup> Appendix 1 shows the major nutrition-related indicators for each country in sub-Saharan Africa.

Sub-Saharan Africa	23.2	236.5	32.6	53.8	6.9	11.5	39.2
Central Africa	26.1	42.7	32.1	9.3	7.1	2.1	44.8
East Africa	31.4	132.2	35.6	23.9	6.0	4.0	30.3
South Africa	8.4	5.4	29.1	2.0	4.0	0.3	33.6
West Africa	15.1	56.1	29.9	18.6	8.1	5.1	47.0

Source: Food and Agriculture Organization Corporate Statistics Database (FAOSTAT)

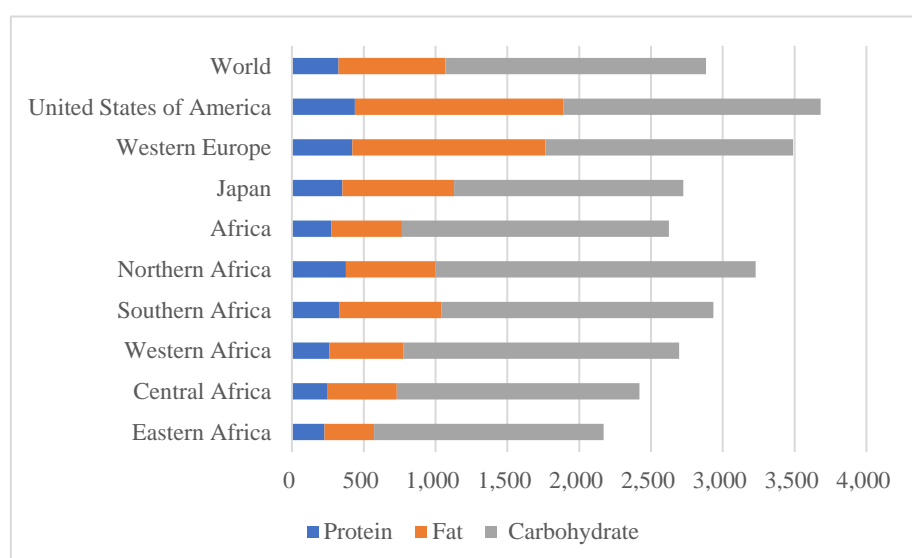
Table 2-2 lists the nutrients and food groups that are effective in mitigating the nutrition issues in sub-Saharan Africa identified in Table 2.1.

**Table 2-2: Nutrients and food groups that are effective in mitigating the nutrition issues in sub-Saharan Africa**

Nutrition issues	Nutrients that have direct effects	Nutrients that have preventive effects	Effective food groups
Prevalence of undernourishment	Calories (especially carbohydrates)	Vitamin B	Grains, Meat, Fish, Beans
Prevalence of stunting under five years old	Protein	Children: Calcium, Vitamin A, Zinc Pregnant women: Iodine, Iron	Meat, Fish, Beans, Vegetables, Fruits
Prevalence of anemia among women of reproductive age	Iron, Protein, Folic Acid	Vitamins, Minerals	Meat, Fish, Beans, Vegetables, Fruits

Source: The Survey Team, based on Global Nutrition Report 2015

As Figure 2-2 shows, sub-Saharan Africa's dietary intake varies across regions, with relatively low calorie intakes in Central and East Africa and low protein intakes in East, West, and Central Africa.



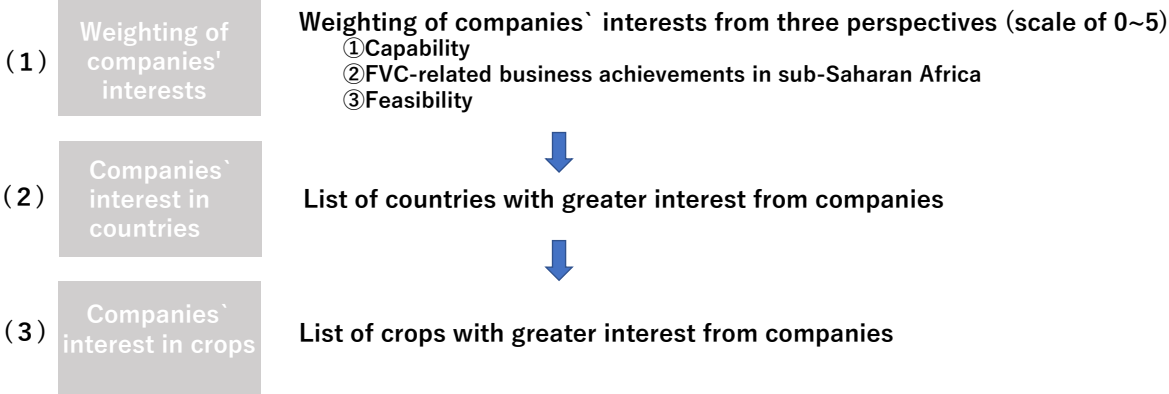
**Figure 2-2: Protein, fat, and carbohydrates as ratios of total calorie intake by region**

**(2013)**

Source: FAOSTAT

2.2.2. Interest of Japanese firms

The survey team collected information on potential crops and countries in sub-Saharan Africa from 48 Japanese companies. Two types of companies were targeted: (1) Japanese companies that work in FVC-related sectors,<sup>2</sup> such as agriculture and the food industry, in sub-Saharan Africa and (2) Japanese companies that are interested in future FVC-related work in sub-Saharan Africa. Companies in group (1) were selected from “the list of Japanese companies related to African business (2017)” created by Africa Business Partners<sup>3</sup>. Information on companies in group (2) was collected by connecting with companies through TICAD7-related seminars and events hosted by JICA, the Japan External Trade Organization, the African Development Bank, the World Bank, United Nations University, and PPP platforms, such as the Africa FVC working group within the JICA Platform for Food and Agriculture (JiPFA)<sup>4</sup> and the Nutrition Japan Public Private Platform. The survey method<sup>5</sup> consisted of interviews with 35 companies<sup>6</sup> and web questionnaires completed by 13 companies. Based on the survey results, potential crops and countries were determined using the steps shown in Figure 2-3.



**Figure 2-3: Selection of countries and crops with high interest from companies**

Source: The Survey Team

(1) Weighting of companies' interest

To identify the countries in which companies are interested, it is necessary to aggregate the interest that each company has in FVC business in Africa. Companies' interest was weighted from zero to five points from the three perspectives shown in Table 2-3.

<sup>2</sup> The selected companies are those that conduct business related to the production, manufacturing and processing, distribution, or consumption of agriculture, forestry, and marine products.  
<sup>3</sup> Africa Business Partners is an advisory firm for supporting African business established in July 2012.  
<sup>4</sup> The JiPFA was established for enhancing agricultural cooperation. The first meeting of the Africa FVC working group was held on April 25, 2019, at JICA Ogata Sadako Research Institute for Peace and Development.  
<sup>5</sup> The survey team prioritized interviews above web questionnaires because detailed information, such as future business plans, is necessary to understand companies' specific interests and develop project plans to support PPPs.  
<sup>6</sup> The interviews include face-to-face, Skype, telephone, and email interviews.

**Table 2-3: Items for weighting companies' interest**

1. Capability		2. FVC-related business achievements in sub-Saharan Africa				3. Feasibility	
Company size	Achievements in overseas expansion	Achievements in agriculture and food-related businesses	Type of business	Relevance to the FVC	Achievements in cooperation with local partners	New business plan	Willingness to expand sub-Saharan African business in the future

Source: The Survey Team

(2) Companies' interest in countries

Using this evaluation method, companies' interests (considering that one company may have interest in multiple countries) were scored, tabulated by country, and listed in order from greatest to least amount of interest, as in Table 2-4. Based on this method, the top five countries were Kenya, Tanzania, Zambia, Nigeria, and Madagascar.

**Table 2-4: Companies' interest in countries**

Country		Score	Country		Score
1	Kenya	56	11	Burkina Faso	13
2	Tanzania	46	12	Ethiopia	13
3	Zambia*	31	13	Zimbabwe	10
4	Nigeria	25	14	Senegal	5
5	Madagascar	21	15	Cote d'Ivoire	5
6	Malawi	20	16	Kingdom of Eswatini	5
7	Uganda	19	17	Burundi	2
8	Ghana	18			
9	Rwanda	18			
10	Mozambique	15			
				Total	322

\*Zambia was originally selected, and the survey was conducted there.

Source: The Survey Team

(3) Companies' interest in crops

The crops in which the 48 companies have shown interest (considering that one company may show interest in multiple crops) are scored as described in Table 2-3, and the scores are totaled for each crop. The top four crops identified in the top five countries of interest are listed in Table 2-5. The table shows that interest in beans (including soybeans) and rice is high.

**Table 2-5: Companies' interest in crops in the top five countries of interest**

	Country	Crops	Score
1	Kenya	Horticultural crops	24
		Soybeans	13
		Sea fishery	11
		Beans	5
2	Tanzania	Fruits and fruit trees	13



		Rice	11
		Sesame	7
		Soybeans	4
3	Zambia	Soybeans	20
		Inland water culture	9
		Poultry	5
		Beans	5
4	Nigeria	Rice	13
		Tomatoes	10
		Sesame	5
		Cacao	5
5	Madagascar	Beans	10
		Rice	5
		Cacao	4
		Vanilla	2

Source: The Survey Team

The results for countries besides the top five countries of interest are shown in Table 2-6.

**Table 2-6: Companies' interest in crops in countries other than the top five countries of interest**

Countries	Crops
Malawi, Uganda, Ghana, Rwanda, Mozambique, Burkina Faso, Ethiopia, Zimbabwe, Senegal, Cote d'Ivoire, Kingdom of Eswatini, Burundi	Soybeans, Beans, Vegetables, Tomatoes, Rice, Fishery, Livestock, Sesame, Nuts, Sweet potatoes, Moringa, Grasscutter <sup>7</sup> , Vanilla, Strawberries, Honey, etc.

Source: The Survey Team

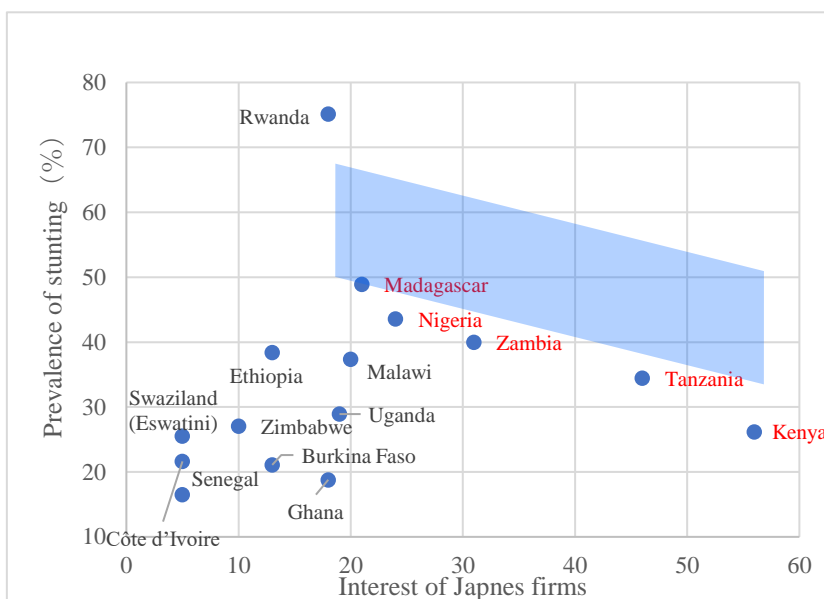
In addition, logistics, fertilizers, agricultural machines, food processing machines, school catering, health food and supplements, and lifestyle-related disease prevention applications were mentioned as cross-cutting interests unrelated to specific countries or crops. For these interests, needs are surveyed within the value chains of the target crops.

### 2.2.3. Selection of Target Countries

Based on the results of the analyses described in sections 2.2.1. and 2.2.2, the survey's five target countries are selected. The data described in section 2.2.2.(2) are used to indicate Japanese firms' interest levels. The prevalence of undernourishment, stunting under five years of age, and anemia among women of reproductive age, which are serious nutritional issues in sub-Saharan Africa, are used as indicators of development needs (i.e., food security and nutrition). Excluding countries with high security restrictions, three charts are formulated with three indicators of development needs on the Y-axis and the feasibility of the FVC development indicator on the X-axis, as shown in Figures 2-4, 2-5, and 2-6. The five countries (Kenya, Tanzania, Zambia, Nigeria, Madagascar) with high values for both indicators, which are covered by the shaded areas of the

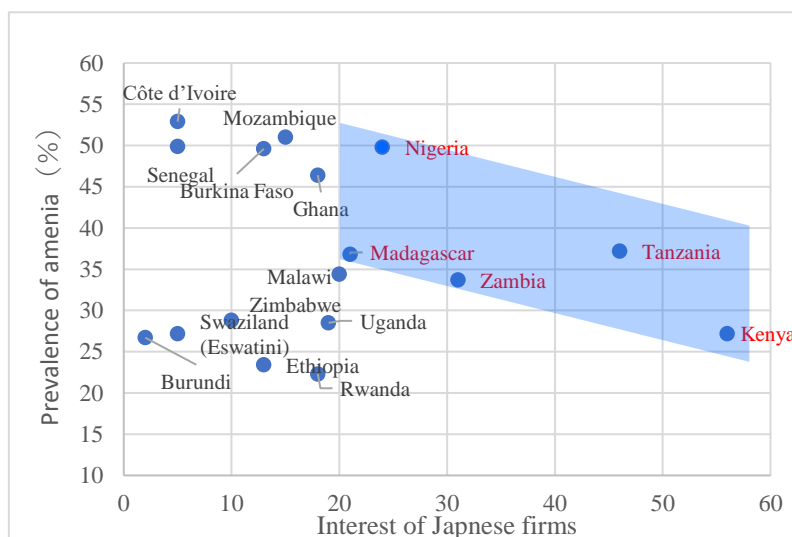
<sup>7</sup> The grasscutter (African rat) is a mouse native to Africa. It is commonly eaten locally.

figures, are selected as the target countries of the survey.



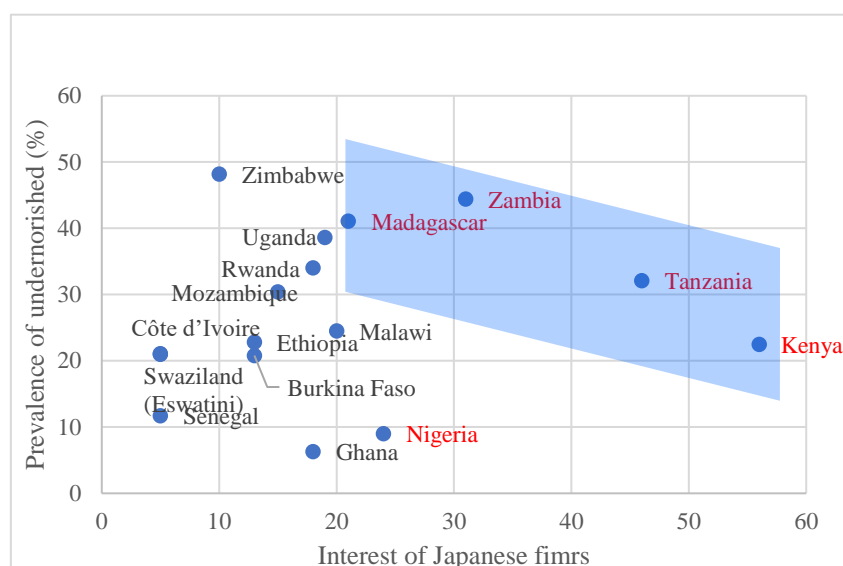
**Figure 2-4: Plot of prevalence of stunting under five years of age and Japanese firms' interest levels**

Source: FAOSTAT and the Survey Team



**Figure 2-5: Prevalence of anemia among women of reproductive age and Japanese firms' interest levels**

Source: FAOSTAT and the Survey Team



**Figure 2-6: Plot of prevalence of undernourishment and Japanese firms’ interest levels**

Source: FAOSTAT and the Survey Team

### 2.3. Selection of Target Crops

Table 2-7 shows the crops in which firms showed high interest for each target country. Clearly, these crops can contribute to the mitigation of nutrition issues in sub-Saharan Africa and have high production potential in this region. The target crops of other existing or planned JICA surveys are given lower priority for this survey. Thus, the top three crops for each target country, which are shaded in Table 2-7, are selected as the target crops for the survey.

**Table 2-7: Crops in which Japanese firms show interest and JICA surveys**

Country	Crops in which Japanese firms show interest	Score	Target crops of other existing or planned JICA surveys
Kenya	Horticultural crops <sup>8</sup>	24	
	Soybeans	13	
	Sea fishery	11	*
	Beans	5	
Tanzania	Fruits and fruit trees <sup>9</sup>	13	
	Rice	11	*
	Sesame	7	
	Soybeans	4	
Zambia	Soybeans	20	
	Inland water culture	9	
	Poultry	5	
	Beans	5	
Nigeria	Rice	13	*
	Tomatoes	10	

<sup>8</sup> Owing to the wide range of interest in horticultural crops, this survey targets avocados and French beans based on their production and exportation potential.

<sup>9</sup> Avocados (based on their production potential) and macadamia nuts (based on Japanese firms’ interest levels) are selected as target crops among fruits and fruit trees.

	Sesame	5	
	Cacao	5	
Madagascar	Beans	10	
	Rice	5	*
	Cacao	4	
	Vanilla	2	

Source: The Survey Team

## 2.4. Nutrition and production potential

Table 2-8 shows the potential contribution to the mitigation of nutrition issues and the production potential for each target crop (selected in section 2.3) in each target country (selected in section 2.2). All of the selected crops have high potential to contribute to both the mitigation of nutrition issues and production.

**Table 2-8: Evaluation of selected target crops**

Country	Crops	Contribution to nutrition issues	Production potential
Kenya	French beans	Can improve stunting in children and anemia in women as sources of vitamins and minerals	Both temperature and precipitation are suitable for cultivation, and the yield is high compared to neighboring countries.
	Soybeans	Can improve stunting and undernourishment in children as a source of protein and vitamin B2	Weather conditions are suitable for soybean cultivation, but the production volume and yield are lower than in neighboring countries.
	Avocados	Can improve stunting in children and anemia in women as a source of vitamins and minerals	Weather conditions are suitable for avocado production, and the production scale is expanding annually.
Tanzania	Sesame	Can improve stunting and undernourishment in children as a source of protein and vitamin B2	Weather conditions are suitable for soybean cultivation, but the production volume and yield are lower than in neighboring countries.
	Avocados and macadamia nuts (horticultural products)	Can improve stunting in children and anemia in women as a source of vitamins and minerals	The cultivation area and yield are higher than in neighboring countries.
Zambia	Soybeans	Can improve stunting and undernourishment in children as a source of protein and vitamin B2	Weather conditions are suitable for soybean cultivation. Zambia is the second largest soybean producer in Southern Africa.
	Inland water culture	Can improve stunting and undernourishment in children as a source of protein and vitamin B2	This crop refers to aquaculture on scattered lakes. Feed access is relatively good compared to the surrounding countries.
	Poultry	Can improve stunting and undernourishment in children as a source of protein and vitamin B2	Weather conditions are suitable for poultry farming. Feed access is relatively good compared to the surrounding countries.
Nigeria	Tomatoes	Can improve stunting in children and anemia in women as a source of	The production volume is the highest in the area, but the yield is relatively low.

		vitamins and minerals	
	Sesame	Can improve stunting in children and anemia in women as a source of vitamins and minerals	In Africa, Nigeria is the second-largest producer of soybeans, although its soybean yield is not high.
	Cacao	Can improve stunting and undernourishment in children as a source of protein and vitamin B2	Although the yield is low, the suitable area for cacao cultivation is larger than in neighboring countries.
Madagascar	Beans	Can improve stunting and undernourishment in children as a source of protein and vitamin B2	Although the production volume and yield are low, weather conditions are suitable for cultivation.
	Cacao	Can improve nutritional conditions by generating income	Although the production volume and yield are low, weather conditions are suitable for cultivation.
	Vanilla	Can improve nutritional conditions by generating income	Madagascar produces the largest amount of vanilla in the world and has high cultivation potential.

Source: The Survey Team



## Chapter 3. Survey Results on Nutrition and Food Security





## Chapter 3. Survey Results on Nutrition and Food Security

### 3.1. Africa's Nutrition and Food Security Status

In recent years, it has been pointed out that food security in Africa has deteriorated because of a slowdown in economic growth due to the falling prices of oil and mineral resources; unfavorable climate conditions, such as droughts and floods; and conflicts. In particular, prolonged droughts have been observed in Southern and Eastern Africa, and many international organizations have been alarmed by the deterioration in food security<sup>1</sup>.

The worldwide prevalence of undernourishment (PoU)<sup>2</sup> estimated by the Food and Agriculture Organization of the United Nations (FAO) continually decreased from 2005 to 2015 but has increased since 2016. Africa follows the same trend, but, in Africa, the total undernourished population, rather than the percentage that is undernourished, is steadily increasing. Sub-Saharan Africa, which includes all of Africa except Northern Africa, follows the same trend.

**Table 3-1: PoU in African Regions**

Year	PoU (%)					Population (millions)				
	2005	2010	2015	2016	2017	2005	2010	2015	2016	2017
World	14.5	11.8	10.6	10.8	10.9	945	820.5	784.4	804.2	820.8
Africa	21.2	19.1	18.6	19.7	20.4	196	200.2	222	241.3	256.5
Northern	6.2	5.0	8.0	8.5	8.5	9.7	8.5	18.1	19.5	20
Sub-Saharan	24.3	21.7	21.1	22.3	23.2	176.7	181	203.9	221.9	236.5
Central	32.4	27.8	24.1	25.7	26.1	36.2	36.5	37.1	40.8	42.7
Eastern	34.3	31.3	30.5	31.6	31.4	113.5	119.1	121.4	129.6	132.2
Southern	6.5	7.1	7.9	8.2	8.4	3.6	4.2	5	5.2	5.4
Western	12.3	10.4	11.4	12.8	15.1	33.0	31.9	40.4	46.3	56.1

Source: 2018 Africa Regional Overview of Food Security and Nutrition, Table 1.

Within sub-Saharan Africa, Eastern Africa has maintained a steady PoU and has a larger undernourished population than the other sub-regions have. The PoU in Southern Africa is lower than that in the other regions, but it has been increasing since 2005. Western Africa's trends are similar to those in Africa or sub-Saharan Africa as a whole, but its PoU had already increased between 2010 and 2015. Central and Western Africa have experienced large increases in recent years, especially in Western Africa from 2016 to 2017.

The stunting<sup>3</sup> rate of children under five years of age in Africa is as high as 30.3%. Many of these children live in sub-Saharan Africa, and they account for about one-third of the world's

<sup>1</sup> 2018 Africa Regional Overview of Food Security and Nutrition, p. 2

<sup>2</sup> The PoU, developed by the FAO, is an indicator of whether a population's typical food consumption is insufficient for the daily energy intake needed for normal activity and healthy life (2018 Africa Regional Overview of Food Security and Nutrition, p. 3).

<sup>3</sup> Stunting refers to children who are short for their age (month) and indicates chronic malnutrition.

stunted children. In Eastern Africa, both the rate and population of stunted children are higher than in other sub-regions. In contrast, Southern Africa has a stunting rate of about 30%, which is not much different from that of Africa as a whole; however, Southern Africa’s population of stunted children is as low as two million.

The proportion of wasting<sup>4</sup> in children under the age of five is lower in Africa (7.1%) than in the world (7.5%). The prevalence of wasting is lower in sub-Saharan Africa than in Northern Africa, but the corresponding population is 11.5 million, which is about one-quarter of the world’s total population of children with wasting. Eastern and Western Africa have large populations of children experiencing wasting. In Western Africa, the prevalence of wasting is 8.1%, which is higher than the prevalence worldwide. Conversely, Southern Africa has a lower prevalence of wasting and a smaller population with wasting.

**Table 3-2: Undernutrition of Children under Five Years Old in Africa (2017)**

	Stunting		Wasting	
	(%)	Population (millions)	(%)	Population (millions)
World	22.2	150.8	7.5	50.5
Africa	30.3	58.7	7.1	13.8
Northern	17.3	5.0	8.1	2.3
Sub-Saharan	32.6	53.8	6.9	11.5
Central	32.1	9.3	7.1	2.1
Eastern	35.6	23.9	6.0	4.0
Southern	29.1	2.0	4.0	0.3
Western	29.9	18.6	8.1	5.1

Source: 2018 Africa Regional Overview of Food Security and Nutrition, Tables 3 and 4.

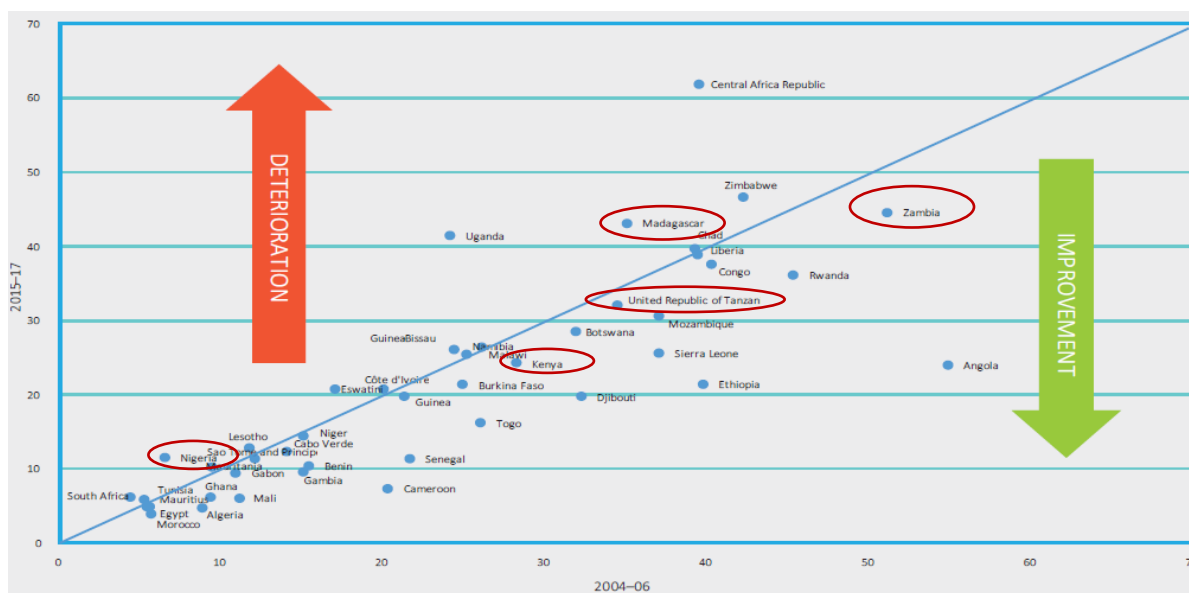
**3.2. Nutrition and Food Security Status in Target Countries**

**3.2.1. Prevalence of Undernourishment (PoU)**

Figure 3-1 compares the PoU in African countries from 2004 to 2006 and 2015 to 2017. For this survey’s target countries, we note that in about ten years, the PoU has improved in Kenya, Tanzania, and Zambia and has worsened in Madagascar and Nigeria. The two countries in which the PoU has worsened, along with the Central African Republic, Uganda, and Zimbabwe, have particularly large increases in the PoU relative to other sub-Saharan African countries. In Madagascar and Kenya, the extreme climate in 2016 caused domestic food shortages<sup>5</sup>.

<sup>4</sup> Wasting refers to children whose weight is low for their height and indicates acute malnutrition.

<sup>5</sup> 2018 Africa Regional Overview of Food Security and Nutrition, p. 6.



**Figure 3-1: Changes in the Prevalence of Undernourishment in Africa**

Source: 2018 Africa Regional Overview of Food Security and Nutrition, Figure 2.

We now describe the positioning of the survey’s target countries within Africa.

In Kenya, the PoU decreased from 28.2% in 2005 to 24.2% in 2016 but remains slightly higher than the overall PoU in sub-Saharan Africa. Kenya’s PoU fell to 20.8% in 2013 and 2014, but it has increased since 2015. Agricultural production and livestock were negatively impacted by the extreme climate caused by the El Niño phenomenon in 2015-2016. Its effects have continued, leading to prolonged drought. With conflicts in some parts of Kenya, the prices of staple foods are soaring<sup>6</sup>.

In Tanzania, the PoU was 34.4% in 2005 and 32% in 2016. Although it has decreased slightly over those ten years, it has largely remained flat, ranging from 32% to 35% each year. Tanzania’s PoU is higher than Kenya’s and is about the same as Eastern Africa’s as a whole. Tanzania’s undernourished population has increased almost every year, going from 13.6 million in 2005 to 17.8 million in 2016, which exceeds that of Kenya in 2016 by 11.7 million.

In Zambia, the PoU decreased from about 51.1% in 2005 to 44.5% in 2016. Although Zambia’s PoU is still high compared to other African countries, it decreased slightly in almost every year. Zambia’s undernourished population has increased from 6.2 million in 2005 to 7.4 million in 2016.

Madagascar is one of the countries with the largest increase in the PoU over the past ten years, going from 35% in 2005 to 41.1% in 2016, and its PoU is also higher than those of other African countries. Madagascar’s PoU has been increasing every year since 2011 and has been

<sup>6</sup> 2018 Africa Regional Overview of Food Security and Nutrition, p. 5.

significantly increasing since 2014. As in Kenya, an extreme climate caused droughts in Madagascar’s south and southeast regions for the three years prior to the end of 2016<sup>7</sup>. Madagascar’s undernourished population also increased significantly from 6.4 million in 2005 to 10.7 million in 2016. This increase is higher than in Zambia, which had a similarly-sized undernourished population in 2005.

Nigeria’s PoU increased from 6.5% in 2005 to 11.5% in 2016. Although it is lower relative to Africa as a whole, it has increased significantly over the past decade. Specifically, Nigeria’s PoU has increased every year since 2011 and especially since 2015. The undernourished population has increased markedly from 9.1 million in 2005 to 21.5 million in 2016. The recent PoU increase in Western Africa is attributed in part to Nigeria, which accounts for about half of this region’s population. A fall in the prices of commodities, such as oil, has led to currency depreciation, high inflation, and soaring prices of food, especially rice. Food insecurity has grown owing to an increase in persons displaced by violence in Nigeria’s northeast<sup>8</sup>.

3.2.2 Undernutrition of Children

Figure 3-2 compares the rates of stunting among children under five years of age in African countries by gender. Similarly, Figure 3-3 shows the rates of wasting among children under the age of five (no comparable data for this figure are available for Madagascar). The following discussion describes the positioning of the target countries within Africa.

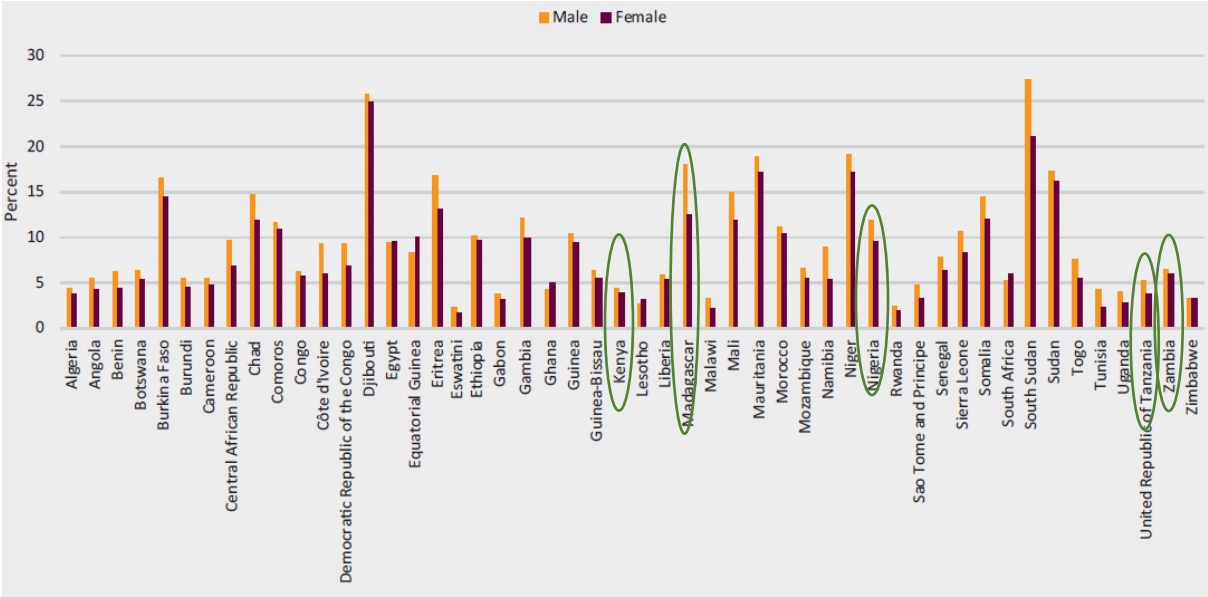
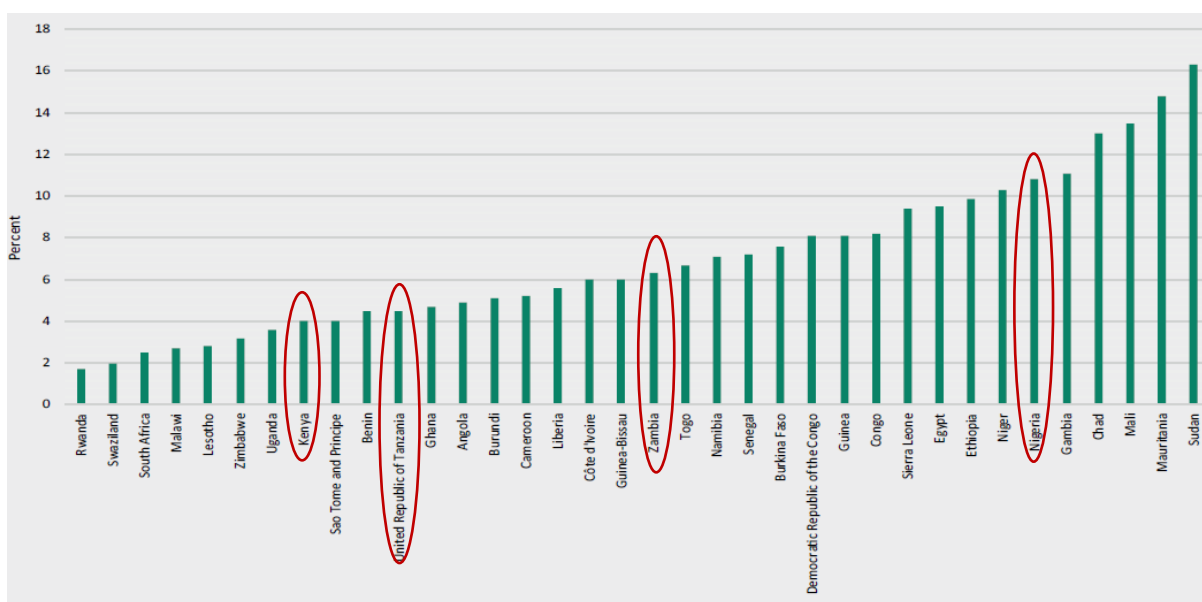


Figure 3-2: Prevalence of Stunting in Children Under Five Years Old in Africa

Source: 2018 Africa Regional Overview of Food Security and Nutrition, Figure 4.

<sup>7</sup> 2018 Africa Regional Overview of Food Security and Nutrition, p. 6.

<sup>8</sup> 2018 Africa Regional Overview of Food Security and Nutrition, p. 4.



**Figure 3-3: Prevalence of Wasting in Children Under Five Years Old in Africa**

Source: 2018 Africa Regional Overview of Food Security and Nutrition, Figure 5.

The prevalence of stunting among children under five years of age in Kenya is low relative to other African countries and is lower than in neighboring countries (i.e., Ethiopia, Uganda, and Tanzania). Kenya also has a low prevalence of wasting in children under the age of five relative to other African countries. Although its prevalence is the lowest among this survey’s target countries, however, it is higher than those of its neighbors Uganda and Malawi.

The rate of stunting in Tanzania is relatively low among African countries; it is lower than in neighboring Zambia and Mozambique but higher than in Kenya. Tanzania’s rate of wasting is slightly higher than Kenya’s and is relatively low among African countries.

Although Zambia’s rate of stunting is not extremely high relative to all African countries, it is higher relative to some neighboring countries (i.e., Angola, Malawi, Tanzania, and Zimbabwe), although it is lower than the Democratic Republic of the Congo’s rate of stunting and similar to Mozambique’s. Zambia’s rate of wasting among children under five years of age ranks as moderate among African countries. Although Zambia’s rate is lower than the Democratic Republic of Congo’s, it is higher than Tanzania’s, Zimbabwe’s, and Malawi’s.

The prevalence of stunting in Madagascar is relatively high among African countries. Generally, boys have higher stunting rates than girls do throughout the world, but the gender gap is particularly large in Madagascar. Although Madagascar does not have comparable data to that shown in Figure 3-3 as it comes from a different source, its rate of wasting is high relative to

other African countries, with a prominently higher prevalence among boys<sup>9</sup>.

The rate of stunting in Nigeria is not extremely high relative to other African countries, and it is lower than in neighboring Niger. However, Nigeria's rate of stunting is twice as high as in neighboring Ghana and Cameroon. Nigeria has the highest rate of wasting in children under five years of age among this survey's target countries. Nigeria's rate of wasting is lower than those of a group of countries, including Sudan, Mali, and Chad, with dry and harsh climates and large displaced populations due to conflicts and violence.

### 3.3. Survey Results in Kenya

#### 3.3.1. Nutritional Indicators in Kenya

Kenya's nutritional indicators are shown in Table 3-3<sup>10</sup>.

**Table 3-3: Nutritional Indicators in Kenya (Children under Five Years Old)**

	Stunting	Wasting	Overweight
Overall	26.0%	4.0%	4.1%
Severe	8.1%	0.9%	—
Boys	29.7%	4.4%	4.7%
Girls	22.3%	3.7%	3.5%
Urban	19.8%	3.4%	5.5%
Rural	29.1%	4.4%	3.4%
Coast region	30.8%	4.5%	3.3%
North Eastern region	24.7%	13.3%	2.6%
Eastern region	30.1%	4.4%	4.3%
Central region	18.4%	2.3%	6.2%
Rift Valley region	29.8%	5.7%	3.7%
Western region	25.2%	1.9%	3.4%
Nyanza region	22.7%	2.0%	4.4%
Nairobi region	17.2%	2.5%	5.3%

Source: 2014 KDHS

The rate of stunting among children under the age of five is 26% in Kenya, with 8% at a severe level; however, it has decreased by 12 percentage points from 38% in 1998. Specifically, the rate dropped sharply from 35% in 2008. In Kenya, stunting is more frequent among boys than girls and in rural areas than in urban areas. By region<sup>11</sup>, the rate of stunting is the highest in the Coast (31%), Eastern (30%), and Rift Valley regions (30%) and the lowest in the Nairobi (17%) and Central regions (18%). By county, West Pokot County in the Rift Valley region and Kitui County in the Eastern region have extremely high rates of stunting (46%). The lowest rates of stunting

<sup>9</sup> 2018 Africa Regional Overview of Food Security and Nutrition, Figure 6.

<sup>10</sup> 2014 Kenya Demographic and Health Survey (KDHS)

<sup>11</sup> This former region remains as a unit of aggregation in the KDHS even though the administrative units were reorganized in 2013

are in Nyeri County (15%) in the Central region and Garissa County (16%) in the North Eastern region<sup>12</sup>.

The rate of wasting in children under the age of five is 4%, with 1% at a severe level; this rate almost halved over seven years from 7% in 1998, leveled off until 2008, and then declined further. By region, the rate is significantly higher in the North Eastern region (13%), and the rates in the Rift Valley (6%) and Coast regions (5%) are also above the national rate. The rates in the Western, Nyanza, and Central regions (2% each) are the lowest, and the Nairobi region's rate (3%) is also below the national rate. The rate of wasting increases from six to eleven months after birth, and, thus, it is not effective to introduce complementary feeding (to breast milk) at this time. By county, only Turkana County in the Rift Valley region stands out with a rate of 23%, whereas the rate of wasting is almost zero in Siaya County in the Nyanza region<sup>13</sup>.

The rate of overweight children<sup>14</sup> under five years of age is 4%, and the Central (6%) and Nairobi regions (5%) have the highest rates among the regions. The North Eastern (3%), Coast (3%), and Rift Valley regions (4%) have rates below the national level. The overall rate has been gradually declining from 6% since 1998. By county, Kiambu County in the Central Region has the highest rate at 8%, and the rate of overweight children is almost zero in Turkana County in the Rift Valley region, where the prevalence of wasting is prominently high<sup>15</sup>.

### 3.3.2. Women's and Children's Diets

In Kenya, the Food Consumption Score (FCS)<sup>16</sup> indicates that 89% of households consume acceptable numbers of food groups, 10% are on the borderline, and 2% have poor consumption. The number of households on the borderline is higher in rural areas (11%) than in urban areas (7%), and the Nyanza region (13%) and the Rift Valley, Western, and Coast regions (11% each) have the highest fractions of households on the borderline<sup>17</sup>.

Among infants between the ages of 6 and 23 months, 72% consume foods rich in vitamin A. The corresponding percent in rural areas is 65%, which is lower than that in urban areas (83%). By region, vitamin A consumption among infants is highest in the Nairobi region (97%), followed by the Central (84%) and Nyanza regions (80%). It is lowest in the North Eastern region, at 25%, and it is about 67% in the remaining regions<sup>18</sup>.

Again considering infants between 6 and 23 months old, 33% consume iron-rich foods, with lower rates in rural areas (29%) than in urban areas (41%). By region, iron consumption among

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<sup>12</sup> 2014 KDHS

<sup>13</sup> 2014 KDHS

<sup>14</sup> Overweight children are those whose weights are high for their heights. Being overweight leads to obesity.

<sup>15</sup> 2014 KDHS

<sup>16</sup> The FCS is a measure of the diversity of food groups consumed based on a seven-day dietary record of each household (2014 KDHS, p. 18)

<sup>17</sup> 2014 KDHS, p. 19.

<sup>18</sup> 2014 KDHS

infants is highest in the Nyanza (47%), Nairobi (46%), and Central regions (40%). The other regions are below the national level, with the lowest consumption being 21% in the Northeast and Eastern regions<sup>19</sup>.

To determine the contents of meals in rural areas, women with young children from two groups of a surveyed village (i.e., one woman in each group) in western Kenya (i.e., the Rift Valley region) were interviewed about what they had eaten on the previous day, and the foods eaten were classified into ten food groups based on the Minimum Diet Diversity for Women (MDD-W) score<sup>20</sup>. The sample size is very small, but the results show that rural women have dietary diversities of only four to six food groups (reflecting around half of the ten groups). According to a guide by the International Fund for Agricultural Development (IFAD)<sup>21</sup>, women who consume at least five food groups included in the MDD-W score have higher micronutrient intakes than women who do not. Western Kenya (i.e., the Rift Valley and Western regions) has a higher proportion of households with borderline diet diversity according to the FCS, indicating that these MDD-W scores are also at the borderline level<sup>22</sup>.

**Table 3-4: Diet Diversity of Villages in Western Kenya**

County	Narok	
Site of Study	Ogwedhi (Group A)	Ogwedhi (Group B)
Tribe	Luo	
Time of Study	September 2019	
Season	Dry season	
MDD-W Score	4/10	6/10

Source: The Survey Team

The food groups commonly consumed by the women from the two surveyed groups were grains/tubers, dark-green leafy vegetables, and other vegetables (i.e., tomatoes and onions). Whereas the woman of Group B consumed small fish called “daga” and beef on the same day, the woman of Group A reported that she eats small fish about once a week. Thus, small fish are eaten at a certain frequency even though the amount consumed is not large. Vegetables are cooked in a simple manner, such as boiling or frying, and small amounts of oil and salt are used as seasonings. The women did not consume any dairy, eggs, or fruit. Bio-fortified potatoes and cassava were not consumed, but some fortified varieties are sold in urban supermarkets. The staple food was ugali, a porridge made of maize, and rice was not consumed.

Kenya has a dry zone that accounts for 83% of its territory, but the northern part, which is dominated by arid and semi-arid land, is said to be particularly affected by droughts. In the

<sup>19</sup> 2014 KDHS

<sup>20</sup> IFAD (2018), *Nutrition-Sensitive Value Chain: A Guide for Project Design*. Volume II (resources): pp. 25-28.

<sup>21</sup> IFAD (2018), *Nutrition-Sensitive Value Chain: A Guide for Project Design*. Volume II (resources): p. 25.

<sup>22</sup> Women who consume more than five of the ten food groups included in the MDD-W score have higher micronutrient intakes than women who do not.



western part, where the interviews took place, seasonal food shortages are considered to be relatively small, as this region has a certain level of annual rainfall, although there are regional differences.

However, the rates of stunting and wasting in the Rift Valley region, where the interviews were conducted, are higher than the national average, and the interview results suggest that women in this region tend to have diets with large amounts of carbohydrates, small amounts of vegetables, and occasional protein. The woman of Group A had the same meals at lunch and dinner, which is why the number of food groups is not greater. When people gathered from both groups were asked how many times they ate meals per day on average, all answered that they ate three meals a day. However, according to a local person who is familiar with the villagers, the typical frequency of meals per day is two among farmers. It is possible that the villagers answered that they had three meals a day because they were asked as a group and, thus, were concerned about attention from others or looking good.

### 3.4. Survey Results in Tanzania

#### 3.4.1. Nutritional Indicators in Tanzania

Tanzania’s nutritional indicators are shown in the following table <sup>23</sup>.

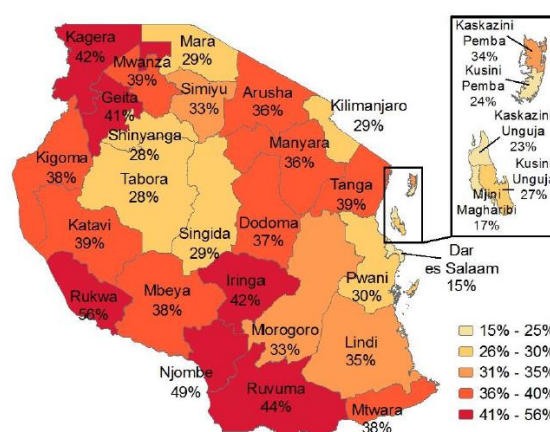
**Table 3-5: Nutritional Indicators in Tanzania**

	Children under five years old				Women (15-49 years old)
	Stunting	Wasting	Overweight	Anemia	Anemia
Overall	34.4%	4.5%	3.6%	57.7%	44.8%
Severe	11.7%	1.2%	—	1.6%	0.9%
Boys	36.7%	5.2%	3.7%	59.5%	—
Girls	32.2%	3.8%	3.6%	56.0%	—
Urban	24.7%	3.8%	4.0%	53.5%	44.5%
Rural	37.8%	4.7%	3.5%	59.2%	45.0%
By Zone					
Western	32.1%	4.6%	2.7%	64.0%	53.7%
Northern	36.1%	4.4%	6.0%	50.8%	36.1%
Central	34.2%	5.6%	2.5%	45.5%	31.1%
Southern Highlands	44.8%	2.6%	5.0%	44.4%	34.4%
Southern	36.7%	2.3%	3.4%	59.4%	47.8%
South Western Highlands	43.1%	4.7%	6.7%	54.3%	28.8%
Lake	35.7%	4.2%	3.0%	62.1%	52.0%
Eastern	22.9%	5.1%	2.9%	61.2%	51.4%
Zanzibar	23.5%	7.1%	2.8%	64.5%	60.1%

(Note: “Zones” are used to organize regions geographically, but they are not administrative units.)

Source: 2015-16 TDHS-MIS

In Tanzania, the rate of stunting among children under five years of age is 34%, with 12% at severe levels, but it has steadily declined from 50% since 1996. The rate is slightly higher among boys than girls, and it is higher in rural areas than in urban areas. The Southern Highlands (45%) and South Western Highlands zones (43%) have very high rates, with the highest in the Rukwa (56%), Njome (49%), and Ruvuma (44%) regions. The lowest rate is in the Dar es Salaam region (15%)<sup>24</sup>.



**Figure 3-4: Stunting in Tanzania (by Region)**

Source: 2015-16 TDHS-MIS, Figure 11.3

<sup>23</sup> 2015-16 Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS)

<sup>24</sup> 2015-16 TDHS-MIS

The prevalence of wasting in children under five years of age is 5%, with 1% at severe levels. This prevalence has fallen from 8% in 1996 to 5%, but it has remained flat in recent years. The prevalence of wasting is higher in the three regions of Zanzibar, that is, Kusini Pemba (9%), Kaskazini Pemba (9%), and Kusini Unguja (8%), than in the mainland<sup>25</sup>.

Among children under the age of five, 4% are overweight, with the highest rates in the Southwestern Highlands (7%) and Northern (6%) zones and Kilimanjaro (9%), Singida (8%), and Mbeya (8%) regions. The Simiyu region has the lowest rate of overweight children (1%)<sup>26</sup>. The prevalence of stunting is high in the South Western Highlands and Northern zones, where it is suggested that the “double burden of malnutrition”<sup>27</sup> has appeared.

Again considering children under the age of five, 58% have some level of anemia, with higher rates under the age of two. In particular, the rate of anemia is 81% at the ages of 9-11 months. The Zanzibar zone (65%) has the highest rate of anemia, but, by region, Shinyanga (71%), Geita (68%), and Kigoma (68%) regions have the highest rates on the mainland. The lowest rate is 37% in the Singida and Njombe regions. The rate of anemia in women of reproductive age (ages 15-49 years) is 45% overall, with 57% of pregnant women and 46% of lactating women having anemia. The Zanzibar zone has higher rates of anemia than the mainland has, and the region with the highest rate is the Kaskazini Pemba region (72%)<sup>28</sup>.

#### 3.4.2. Women’s and Children’s Diets

In Tanzania, 62% of households have three or more meals per day, and 38% have fewer than two meals per day. In rural areas, 45% have fewer than two meals per day, a higher percentage than in urban areas (23%). Many households (28%) eat meat or fish zero days in a week, and others do so only one or two days a week (19% each). In rural areas, 36% of households do not eat meat or fish at all, whereas in urban areas, many (20%) eat meat or fish two days a week. However, in Zanzibar zone, a very large portion (35%) of households eat meat or fish seven days a week<sup>29</sup>.

In Tanzania, only 10% of infants (6-23 months of age) consume a minimum acceptable diet combining breast milk and complementary feeding, as defined by the World Health Organization (WHO). Fewer children are fed a standard diet in rural areas (7%) than in urban areas (12%)<sup>30</sup>. This lack of an acceptable diet causes stunting and micronutrient deficiencies.

Among infants between 6 and 23 months of age, 76% consume vitamin A-rich foods. The

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<sup>25</sup> 2015-16 TDHS-MIS

<sup>26</sup> 2015-16 TDHS-MIS

<sup>27</sup> The “double burden of malnutrition” refers to simultaneous progress of undernutrition (stunting, underweight, wasting, and micronutrient deficiencies) and overnutrition (overweight and obesity) in the same area, household, and life course.

<sup>28</sup> 2015-16 TDHS-MIS

<sup>29</sup> 2015-16 TDHS-MIS

<sup>30</sup> 2015-16 TDHS-MIS

corresponding percent in rural areas is 73%, which is lower than in urban areas (82%). The highest rate of vitamin A consumption among infants is in the Southern Highlands zone (89%), followed by the Southern (86%) and Zanzibar zones (84%). The lowest rates are in the Central (68%), Lake (70%), and Northern zones (70%)<sup>31</sup>.

Again considering infants between 6 and 23 months of age, 36% consume foods with iron, and this percent significantly differs between rural (31%) and urban (51%) areas. The rates of iron consumption among infants are high in the Zanzibar (69%) and Southern zones (55%), and the lowest rate is that of the Central zone (21%)<sup>32</sup>.

To determine the contents of meals in rural areas, three rural women with young children living in Arusha Region in northern Tanzania were interviewed by phone about what they had eaten the previous day, and the foods eaten were classified according to ten food groups to compute the MDD-W score. The resulting diet diversity of rural women was between five and seven food groups.

**Table 3-6: Diet Diversity of Villages in Northern Tanzania**

Region	Arusha		
Site of Study	Akeri	Nguruma	Sangarai
Tribe	Msambaa	Mchagga	
Time of Study	November 2019		
Season	Preharvest (Light rainy season)		
MDD-W Score	7/10	5/10	6/10

Source: The Survey Team

The Arusha Region has a mix of dry savanna and rainy mountains and lakes. The food groups reported to be commonly consumed in the three villages were grains/tubers, vegetables (i.e., tomatoes, onions, and carrots), and fruits (mangos). The staple foods are ugali, chapati, and rice. At every meal, some fruits, such as bananas, mangoes, papayas, or watermelons, are consumed. Two of the three women reported that they eat avocados. Avocados are presumably eaten because this region is a leading avocado-producing area. All of the avocados grown for exportation are of the Hass variety, but local varieties are also grown in the region for self-consumption or for direct sale by farmers on the streets. Animal foodstuffs consumed in this region include beef, Nile perch from Lake Victoria, and eggs that can be purchased at local markets. Only small amounts of sugar, oil, and salt are used as seasonings.

These eating practices suggest that fruits can be obtained at low cost from homegrown gardens or local markets. People in this region have access to animal proteins, such as meat or fish, and, thus, the available foods are relatively diverse. However, as mentioned above, in the Northern

<sup>31</sup> 2015-16 TDHS-MIS

<sup>32</sup> 2015-16 TDHS-MIS

zone, the percent of infants who consume foods containing vitamin A is low, and the prevalence of stunting is relatively high. Thus, it is necessary to consider the seasonality of available foods and complementary feeding methods.

### 3.5. Survey Results in Zambia

#### 3.5.1. Nutritional Indicators in Zambia

Zambia's nutritional indicators are shown in the following table<sup>33</sup>.

**Table 3-7: Nutritional Indicators in Zambia**

	Children under five years old				Women (15-49 years old)
	Stunting	Wasting	Overweight	Anemia	Anemia
Overall	34.6%	4.2%	5.2%	58.1%	31.1%
Severe	11.8%	1.5%	—	1.5%	1.4%
Boys	38.3%	4.8%	5.4%	59.7%	—
Girls	31.0%	3.7%	5.0%	56.6%	—
Urban	32.1%	5.0%	5.7%	58.1%	32.1%
Rural	35.9%	3.8%	5.0%	58.2%	30.2%
Central Province	33.4%	4.6%	3.9%	50.0%	23.8%
Copperbelt Province	29.7%	5.4%	5.0%	57.2%	29.2%
Eastern Province	34.2%	2.2%	5.0%	55.9%	27.6%
Luapula Province	44.9%	6.2%	5.2%	70.7%	29.8%
Lusaka Province	35.6%	5.5%	8.1%	57.9%	35.6%
Muchinga Province	32.1%	8.2%	3.5%	53.5%	27.6%
Northern Province	45.8%	3.1%	8.3%	61.3%	28.0%
North Western Province	31.9%	2.4%	3.3%	61.6%	32.2%
Southern Province	29.4%	2.3%	3.8%	55.7%	35.3%
Western Province	29.0%	3.0%	3.0%	60.9%	37.9%

Source: 2018 ZDHS

The percent of children under five years of age with stunting is 35%, and approximately 10% have severely stunting. However, this fraction decreased by five percentage points from 40% in 2013. The rate of stunting is higher among boys than girls, and it is slightly higher in rural areas than in urban areas. By province, Northern (46%) and Luapula (45%) Provinces have the highest rates, and Southern and Western Provinces (both 29%) have the lowest rates.

The rate of wasting in children under five years of age is 4%, with 2% at a severe level, but it decreased to 2% from 6% in 2013. By province, Muchinga (8%), Lusaka (6%), and Luapula (6%) Provinces have higher rates than average, whereas Southern, Northwestern, and Eastern Provinces (all 2%) have the lowest rates.

The percentage of overweight children under five years old is 5%, with the highest rates in

<sup>33</sup> 2018 Zambia Demographic and Health Survey (ZDHS)

Lusaka and Northern Provinces (both 8%) and the lowest rates in North Western and Western Provinces (both 3%). The rate of wasting is also high in Lusaka Province, and, thus, it can be considered to have the “double burden of malnutrition.”

Among children under five years of age, 58% have some degree of anemia, as do 77% of children under two years old. The rates are especially high among children ages 9-11 months and 12-17 months old. By province, the lowest rate is 50% in Central Province, and the highest is 71% in Luapula Province; Luapula also has high rates of stunting and wasting. Among women of reproductive age (15-49 years old), the rate of anemia is 31% overall, 41% in pregnant women, and 28% in lactating women. By province, the rate of anemia is highest in Western Province, at 38%, followed by Lusaka and Southern Provinces (35%) and North Western Province (32%). The lowest rate was in Central Province (24%)<sup>34</sup>.

### 3.5.2. Women’s and Children’s Diets

In Zambia, only 12% of infants (6-23 months old) receive a minimum acceptable diet that combines breastfeeding and complementary feeding, as defined by the WHO, and it is low (8%) for children after 18 months<sup>35</sup>. This lack of an acceptable diet causes stunting and micronutrient deficiencies.

To understand the contents of meals in rural areas, women with young children from three villages (i.e., one from each village) visited by the Survey Team in the northwestern region were asked what they ate on the previous day, and their food items were classified into the ten food groups prescribed by the MDD-W score. In addition, the meals of the Kaonde people in North Western Province, who were identified by a village study of Oyama (2011)<sup>36</sup> and who have a strong tendency toward a self-sufficient diet, were classified using the same method.

**Table 3-8: Diet Diversity of Villages in Northwestern Zambia**

Province	Copperbelt	North Western		
Site of Study	Kalongelwa	Kabibeba	Jukuku	Study by Oyama
Tribe	Lamba	Kaonde		
Time of Study	June 2019			February 2002
Season	Harvesting (Dry)			Preharvest (Rainy)
MDD-W Score	5/10	4/10	6/10	3/10

Source: The Survey Team

Although the sample size was small, the analysis identified that the diet diversity of rural women covers four to six food groups, even during the harvesting season with relatively abundant

<sup>34</sup> 2018 ZDHS

<sup>35</sup> 2018 ZDHS

<sup>36</sup> Oyama, S. (2011), “Is Self-Sufficient Life in Rural Africa Poor?” (in Japanese), E-journal GEO, vol. 5(2). The diet records in Oyama’s study are not completed by individual women.

food. According to Oyama (2011), a total of seven food groups can be consumed during the rainy season; however, over the course of one day, three food groups are consumed, which is fewer than in the dry season<sup>37</sup>. The food groups commonly consumed in all villages are grains/tubers, meat/fish, and dark leafy vegetables, and the meats often come from wild animals, even in villages facing the road. Even if these villages breed chickens and goats, many of them are sold for cash rather than for self-consumption. During the harvesting period, the consumption of beans, nuts (groundnuts), and vegetables is added; however, tomatoes, onions, and cooking oil are used as seasonings. No consumption of dairy products, eggs, or fruits was observed. However, it is said that some wild fruits are collected in the bush in these villages. In addition, eating leftovers prepared on the same day is common, as is eating meals twice a day, skipping breakfast, and eating nshima, a staple food made of sorghum and maize. The National Food and Nutrition Commission of Zambia is planning a national diet survey, but the overall protein intake is considered to be insufficient according to the IFAD questionnaire<sup>38</sup>.

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<sup>37</sup> Oyama, S. (2011), "Is Self-Sufficient Life in Rural Africa Poor?" (in Japanese), E-journal GEO, vol. 5(2).

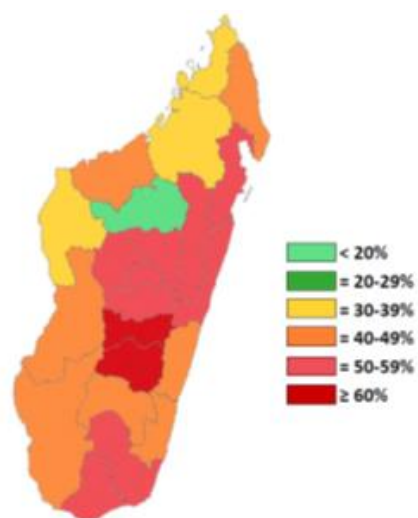
<sup>38</sup> Among the questionnaires conducted by each international organization and governmental institution, only the IFAD's observes the food contents in its project target areas.

### 3.6. Survey Results in Madagascar

#### 3.6.1. Nutritional Indicators in Madagascar

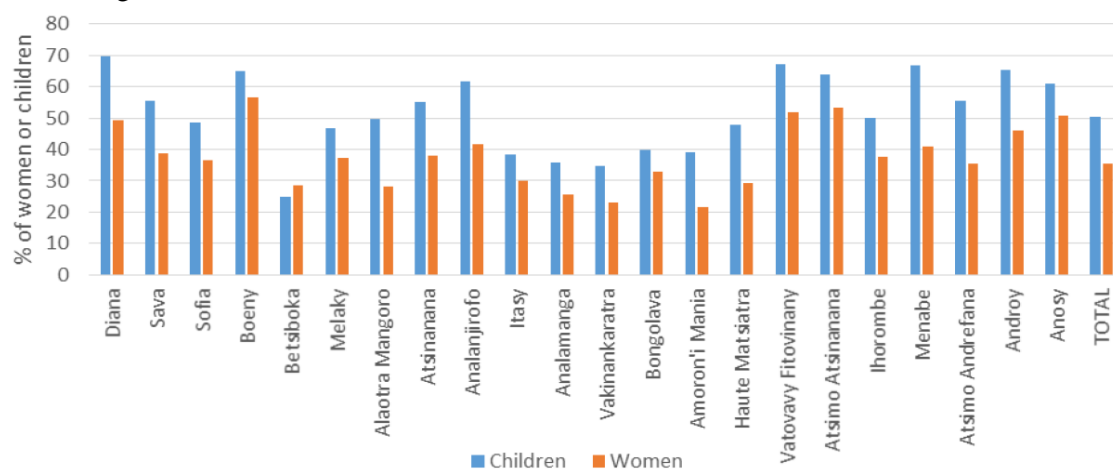
According to a report by the United Nations World Food Programme (WFP)<sup>39</sup>, about half of children under the age of five are stunted in Madagascar, especially in rural areas and the capital. The prevalence of stunting is high even in urban areas with relatively high population densities, and stunting is a challenge faced by both rural and urban areas. Geographically, it is high in the southern region and extremely high in the central region. The overall rate of wasting in children under five years of age is extremely high at 8%, and about half of children under the age of five are anemic. The rate of anemia in women of reproductive age (15-49 years old) for the whole country is 35%.

The regions<sup>40</sup> with high rates of anemia in children under five years of age and women are Diana, Sava, Boeny, Atsinanana, Anatanjirifo, Vatovavy Fitovinany, Atsimo Atsinanana, Menabe, Androy, and Anosy regions, which account for about half of all regions.



**Figure 3-5: Stunting in Madagascar**

Source: Fill the Nutrient Gap Madagascar: Summary Report, Figure 1. (Note: Based on 2008 data; the regional units are divided as they were before 2015.)



**Figure 3-6: Prevalence of Anemia in Children under Five and Women in Madagascar (2008)**

Source: Fill the Nutrient Gap Madagascar: Summary Report, Figure 3.

<sup>39</sup> Fill the Nutrient Gap Madagascar: Summary Report (September 2016). This report's analysis is based on the 2008 Madagascar Demographic and Health Survey (DHS). The Madagascar DHS will be updated in 2020.

<sup>40</sup> The region was the highest administrative unit used between 2009 and 2015. However, the region was abolished in 2015, and, at present, the province is the highest administrative division in Madagascar.



### 3.6.2. Women’s and Children’s Diets

In Madagascar, only 3% of weaning infants (6-23 months) receive a minimum acceptable diet combining breastfeeding and complementary feeding, as defined by the WHO. In addition, it has been pointed out that mothers’ inadequate prenatal nutrition (i.e., low qualities and quantities of meals, iron deficiencies, and young pregnancies) causes stunting<sup>41</sup>.

To observe the contents of meals in rural areas, one woman with a young child living in the Ambanja commune in Diana Prefecture of northern Madagascar (an area in which the prevalence of anemia among children under five years old and women is higher than that of the overall country) was asked to report what she ate on the previous day, and the consumed food items were classified into the ten food groups prescribed by the MDD-W score. The Ambanja commune is a major cacao-producing area and has a tropical climate with an average annual temperature of 26°C. The year is divided into the rainy (December to March) and dry seasons (April to November). Even in the dry season, the sea breeze and nighttime rain ensure suitable humidity for plant growth.

**Table 3-9: Diet Diversity of a Village in Northern Madagascar**

Commune	Ambanja
Site of Study	Benavony
Tribe	Sakalava
Time of Study	November 2019
Season	Harvesting (Dry)
MDD-W Score	3/10

Source: The Survey Team



**Figure 3-7: Small Dried Shrimps Sold in the Village**

The resulting MDD-W score based on the interview mentioned above was three food groups, which is not high. The meal consisted only of staple rice, chicken stewed with tomatoes, a small amount of salt and oil, and water, and the woman ate the same meal for breakfast, lunch, and dinner. All three meals were the same because the woman had a special celebration the day before the interview, and she cooked and ate chickens bred at home.

The interview also asked about her usual meals. Her staple food is rice, and she eats a dried small fish (from the sea) called “henjy” about four times a week as well as small dried shrimp. These types of seafood are sold daily by sales staff from the center of Ambanja to the village, which is located approximately 20km away. The village is rich in fruit trees and consumes such fruits as jackfruits, mangos, papayas, pineapples, oranges, and coconuts daily. The interviewee grows sweet potatoes (not fortified with vitamin A) and cassava for self-consumption. Milk is a high-end product, and she drinks it only once a year. Additionally, she raises livestock, such as

<sup>41</sup> Fill the Nutrient Gap Madagascar: Summary Report (September 2016), p. 4.

pigs, chickens, goats, and cows. Despite the consumption of dried small fish and shrimp in her usual diet, her intake of animal ingredients through meat, such as chicken, and dairy products, such as milk, is very limited, and no consumption of legumes is observed. From this interview, it is inferred that her protein levels are insufficient, and her dietary habits concentrate on carbohydrates from rice, potatoes, and fruits.

Madagascar has a wide variety of products and nutritious ingredients. However, crops are not commonly preserved, and people suffer from food insecurity during the off-season and are vulnerable to the extreme climate. Poor access to markets to buy food and distance and inaccessibility due to rough roads during the rainy season limit food availability. The seasonal variation is greater in the south than in the north, where the field survey was conducted<sup>42</sup>.

According to an analysis by the WFP, the foods available in rural areas lead to deficiencies in calcium, iron, and zinc in infants (6-23 months) and pantothenic acid in lactating women. It has been pointed out that many households have no access to foods containing these micronutrients for economic reasons<sup>43</sup>.

### 3.7. Survey Results in Nigeria

#### 3.7.1. Nutritional Indicators in Nigeria

Nigeria's nutritional indicators are shown in the following table<sup>44</sup>.

**Table 3-10: Nutritional Indicators in Nigeria**

	Children under five years old				Women (15-49 years old)
	Stunting	Wasting	Overweight	Anemia	Anemia
Overall	36.8%	6.8%	2.1%	67.9%	57.8%
Severe	17.1%	2.1%	—	3.0%	1.6%
Boys	39.4%	8.0%	2.3%	69.5%	—
Girls	34.2%	5.6%	1.8%	66.2%	—
Urban	26.8%	5.3%	2.0%	62.0%	53.6%
Rural	44.8%	8.0%	2.1%	72.5%	61.5%
By Zone					
North Central	28.7%	5.6%	2.1%	65.9%	55.2%
North East	49.1%	9.7%	2.9%	70.4%	58.3%
North West	56.8%	9.0%	2.0%	69.9%	58.8%
South East	18.4%	4.5%	2.5%	69.9%	66.0%
South-South	19.7%	4.3%	1.8%	73.2%	60.1%
South West	24.7%	4.9%	1.5%	59.6%	51.1%

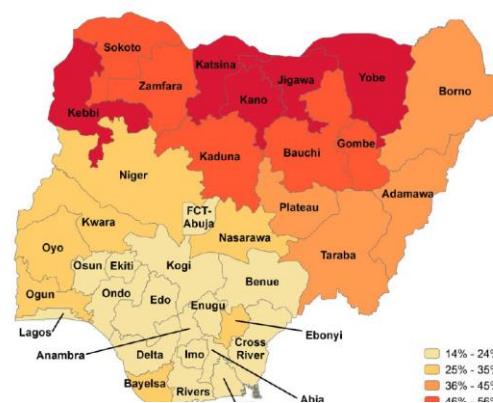
Source: 2018 NDHS

<sup>42</sup> Fill the Nutrient Gap Madagascar: Summary Report (September 2016), p. 4.

<sup>43</sup> Fill the Nutrient Gap Madagascar: Summary Report (September 2016), p. 5.

<sup>44</sup> 2018 Nigeria Demographic and Health Survey (NDHS)

The rate of stunting among children under the age of five is 37%, with 17% of children at severe levels. The rate of stunting is higher in boys than girls, and the rate in rural areas (45%) is almost twice as high as that in urban areas (27%). There are large regional differences, with rates ranging from 57% in the North-West zone to 18% in the South-East zone. By state, the highest rate is that of Kebbi in the North-West zone (66%) and the lowest rate is that of Anambra (14%) in the South-East zone<sup>45</sup>.



**Figure 3-8: Stunting in Nigeria**

Source: 2018 NDHS, Figure 11-1.

The rate of wasting in children under five years of age is 7%, with 2% at severe levels. The rate in rural areas (8%) is almost twice as high as that in urban areas (5%), and those in the North-East (10%) and North-West (9%) zones are twice as high as those in other zones. The rates vary significantly by state, with the highest in Sokoto in the North-West zone (18%) and the lowest in Bayelsa in the South-South zone (1%)<sup>46</sup>.

The percentage of overweight children under five years of age is 2%, with no significant differences between urban and rural areas or across zones. The state with the highest rate is Ekiti (4%), and the state with the lowest rate is Ogun (0%) in the South-West zone<sup>47</sup>.

Among children under the age of 5, 68% have some level of anemia, with the rate being as high as 81% for children aged 12-17 months. The rate in the South-South zone (73%) is the highest, and that in the South-West zone (60%) is the lowest, although the South-South zone is the region with the lowest rates of stunting and wasting. By state, Zamfara in the North-West zone has the highest prevalence of anemia (84%) and Kaduna (48%) has the lowest prevalence<sup>48</sup>.

The prevalence of anemia is 58% among women of reproductive age (15-49 years), 61% among pregnant women, and 60% among lactating women. By state, Sokoto in the North-West zone has the highest percentage of anemia (74%), and Plateau in the North Central zone (44%) has the lowest<sup>49</sup>.

### 3.7.2. Women's and Children's Diets

In Nigeria, only 11% of infants (6-23 months of age) receive a minimum acceptable diet that combines breastfeeding and complementary feeding, as defined by the WHO, and fewer children

<sup>45</sup> 2018 NDHS

<sup>46</sup> 2018 NDHS

<sup>47</sup> 2018 NDHS

<sup>48</sup> 2018 NDHS

<sup>49</sup> 2018 NDHS

are fed borderline diets in rural areas (9%) than in urban areas (14%)<sup>50</sup>. Such diets cause stunting and micronutrient deficiencies.

Among infants between the ages of 6 and 23 months, 59% consume foods rich in vitamin A. This percent is 54% in rural areas, which is lower than that in urban areas (67%). The South-West zone (78%) has the highest rate of vitamin A consumption among infants, and the North-West zone (50%) has the lowest rate. Again considering infants between 6 and 23 months old, 41% consume foods containing iron, and the rates are significantly different between rural (31%) and urban (58%) areas. The highest rate is in the South-West zone (73%), and the lowest rate is in the North-West zone (24%). Fewer foods containing vitamin A and iron are available in the north than in the south<sup>51</sup>.

Of the ten food groups considered by the MDD-W score, 56% of women in Nigeria consume more than five. The rate of intake of five groups or more is higher in the south than in the north and in urban areas than in rural areas. Among women in Nigeria, 19% consumed fried snacks, 16% consumed sweets, and 22% consumed sugar-containing beverages. People in urban areas consume more meat (including chicken), fish, eggs, sweets, and beverages with sugar than people in rural areas<sup>52</sup>.

To understand the contents of meals in rural areas, eight women with young children living in the rural villages of the Gwagwalada Area Council in the Federal Capital Territory (FCT) were asked what they had eaten on the previous day, and their food items were classified into the ten food groups prescribed by the MDD-W score.

**Table 3-11: Diet Diversity of Rural Areas in the FCT, Nigeria**

State	FCT							
Site of Study	Gwagwalada Area Council							
Season	January 2020							
Time of Study	Harvesting (Dry)							
Tribe	Basa			Hausa			Fulani	
MDD-W Score	3/10	4/10	3/10	3/10	3/10	3/10	3/10	4/10

Source: The Survey Team

Two out of the eight women consumed four food groups, and the remaining six consumed three food groups, which are below the MDD-W standard of five food groups. Vegetables grown at home include maize, okra, hibiscus leaf, and amaranth, and the livestock raised include goats and chickens. These women produce vegetables for self-consumption, and some vegetables are obtained from local markets. All of the respondents ate fish<sup>53</sup> at least once a week and meat once

<sup>50</sup> 2018 NDHS

<sup>51</sup> 2018 NDHS

<sup>52</sup> 2018 NDHS

<sup>53</sup> They seem to largely eat dried small fish.

or twice a week. One person ate oranges, and no other fruit was observed in the respondents' diets. Pepper, salt, palm oil, and maggi<sup>54</sup> are used as common seasonings. Maggi is used for soups with amaranth leaves or okra.

Although the FCT is an area with relatively low rates of stunting in children, women still have low diet diversity in rural areas, indicating low protein intakes, as their main diet is carbohydrates and vegetables. In the FCT, only 5%<sup>55</sup> of children under the age of two achieve the minimum acceptable diet that combines breastfeeding and complementary feeding.

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<sup>54</sup> Maggi is an additive-free bouillon consommé.

<sup>55</sup> 2018 NDHS



## **Chapter 4. FVC survey in Kenya**





# Chapter 4. FVC survey in Kenya

## 4.1. Introduction to the FVC survey in Kenya

The Survey Team studied the VCs of soybeans, avocados, and French beans in Kenya. Kenya’s production of soybeans does not meet domestic demand, so Kenya imports a large amount of soybeans. Avocados and French beans are Kenya’s major export crops, and they are mainly exported to European countries. This chapter describes the results of the VC study and then presents concepts for VC development projects created by PPPs.

## 4.2. Soybean VC

### 4.2.1. Overview

Figure 4-1 shows an overview of the soybean VC in Kenya. The main inputs include seeds, fertilizers, and inoculants. Most soybean production is carried out by small-scale farmers, who primarily use manpower and partly use animal power in farming. The harvested soybeans are sun-dried by farmers and then bagged for storage and shipped to buyers. Some of these soybeans are shipped to local markets, but many are shipped to oil producers and livestock feed manufacturers, where they are processed into soybean oil and soybean feed, respectively. Some processors turn soybeans into textured soybean protein. These processed foods are sold in supermarkets and delivered to consumers. Table 4-1 summarizes the prices at each stage of the soybean VC.

**Table 4-1: Soybean prices at each stage of their VC in Kenya**

Farm gate price	38-40 KES <sup>1</sup> /kg	40 Yen/kg – 44 Yen/kg (KES=1.05 Yen)
Wholesale price	50-60 KES/kg	53 Yen/kg – 63 Yen/kg (KES=1.05 Yen)
Retail price	60-90 KES/kg	63 Yen/kg – 95 Yen/kg (KES=1.05 Yen)

Source: The Survey Team

<sup>1</sup> Kenyan Shilling



**Figure 4-1: Outline of the soybean VC in Kenya**

Source: The Survey Team

#### 4.2.2. Agricultural inputs

##### (1) Seeds

The main organization responsible for soybean seed production in Kenya is the Kenya Agricultural and Livestock Research Organization (KALRO). To date, ten varieties have been released, and three more are being developed. Table 4-2 shows the characteristics of the soybean varieties that have been released. In addition, soybean seeds are produced and sold by private companies, such as Seedco, which produces and sells the SC series of soybean varieties. DPSB 19 has a market share for soybean seeds of about 85%, followed by SC Scuire (about 5%) and SC Saga (about 5%).

**Table 4-2: Characteristics of soybean varieties released by KALRO**

Name of Variety	Plant Height (cm)	Pods/Plant (Number)	Maturity Days	Yield (t/ha)	Protein Content (%)	Oil Content (%)
Black Hawk	27	40	85	1.54	33	26
DPSB 19	76	99	92	3.22	41	21
DPSB 8	118	105	88	2.97	40	21
EAI 3600	35	40	92	2.09	35	26
Gazelle	69	54	94	2.13	34	26
Hill	28	34	85	1.73	34	25
931/5/15	34	31	95	1.66	37	24
Keysoy 009	50	46	99	2.08	39	25
Nyala	22	27	85	1.67	35	26

SCS-1	65	49	98	2.17	33	27
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Source: Data provided by KALRO

Kenya has lagged behind other sub-Saharan African countries in developing soybean varieties. In Zambia and Zimbabwe, where soybean cultivation is thriving, the number of registered soybean varieties exceeds 30, and efforts have been made to develop varieties that are difficult to shatter and that are resistant to soybean rust, a serious problem in recent years. However, Kenya has not undertaken sufficient research to develop such soybean varieties. The demand for soybean seeds is estimated to be about 360 tons, and about 98% of this demand is met by recycled seeds obtained by farmers. The reason for this seed recycling is that soybean production is very low to begin with, and even in Western and Nyanza provinces, which are suitable for soybean production, agro-dealers have only a limited number of stores that handle soybean seeds. Hence, the price of soybean seeds is as high as 80–250 KES/kg, which is expensive for local soybean producers.

## (2) Fertilizers

Kenya relies on imports from Europe, South Africa, and North Africa for its fertilizer. Its annual fertilizer consumption was estimated to be about 665,373 tons in 2013, of which about 95% was used for crop production, and the remaining 5% was used for pasture production. Table 4-3 shows the principal fertilizers in use in Kenya as of 2015. The domestic companies that produce compound fertilizers include MEA Limited, Athi River Mining, and Toyota Tsusho Fertilizer Africa Limited, which began operations in 2016. Each company produces compound fertilizers suitable for a particular soil or crop. Baraka fertilizer for legume planting, which is manufactured by Toyota Tsusho Fertilizer Africa, Limited, is a compounded fertilizer for soybeans. This fertilizer contains less nitrogen and large amounts of phosphorus and potassium, which tend to be lacking in soybean cultivation.

**Table 4-3: Major fertilizers used in Kenya**

Fertilizer type	Estimated apparent consumption (tons)	Major crops for application
Di-ammonium phosphate (DAP)	268,988	Cereals, horticulture
Urea	111,123	Cereals, sugarcane
Calcium ammonium nitrate (CAN)	99,898	Cereals, horticulture, coffee
NPK 26:5:5	63,966	Tea
NPK 25:5:5:5S	25,185	Tea
NPK 23:23:0	20,819	Cereals
Calcium nitrate	16,056	Flowers and vegetables
Ammonium sulphate	15,930	Rice
NPK 17:17:17	13,288	Coffee and fruits
Muriate of potash	6,014	Fruits and sugarcane

Source: Fertilizer consumption and fertilizer use by crop in Kenya (2015)

Table 4-4 shows fertilizer distribution channels. The National Cereals and Produce Board (NCPB), which has 180 locations in Kenya, is the base for fertilizer distribution using the subsidy system. Because some farmers have difficulty accessing the NCPB and the NCPB staff frequently commit fraud, a subsidy system using electronic vouchers is being developed.

**Table 4-4: Fertilizer distribution routes in Kenya**

Distribution Channel	Outline
Community-based	Farmers, especially smallholders, are given credit in form of physical farm inputs purchased in bulk by a supporting agency, such as the Kenya Tea Development Agency, that also distributes the fertilizer to the supported farmers.
Private business-based	Network of private, independent importers, wholesalers, and retailers operating on a demand and supply basis
Government-based	Fertilizer is procured, distributed, and sold to target farmers at subsidized prices by the government. Under this system, the government distributes fertilizer to farmers through the NCPB, which has 180 NCPB depots throughout Kenya.
Platform-based	Fertilizer is distributed by private input suppliers through a platform managed by an information and communication technology (ICT) service provider, such as E-Granary.

Source: Fertilizer consumption and fertilizer use by crop in Kenya (2015), partially modified by the Survey Team

(3) Agro-chemicals

Kenya also depends on imports for most of its demand for agro-chemicals. It is reported that Kenya imported 17,803 tons of agro-chemicals in 2018. Of these, 88% were pesticides, fungicides, and herbicides. The import volume of agro-chemicals has been increasing rapidly in recent years. In particular, the import volume of insecticides, fungicides, and herbicides increased by 144% from 2015 to 2018. However, agro-chemicals are rarely applied in soybean cultivation, especially among small-scale farmers.

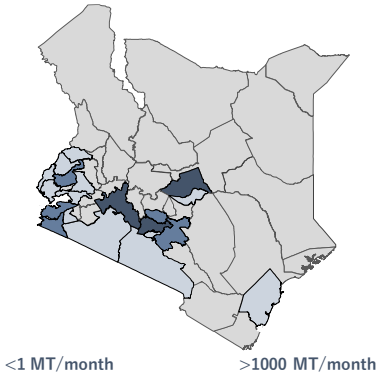
(4) Inoculants

Two types of inoculants are distributed: Biofix, manufactured by MEA, and Nodumax, manufactured by the International Institute of Tropical Agriculture. The price of these inoculants is about 450 KES/bag (150 g), which is enough for about 0.4 hectares (≅ 1 acre) of soybeans. General agro-dealers do not handle inoculants, and contracted soybean producers generally procure inoculants from contracted companies.

4.2.3. Production

(1) Current status of soybean production

There are no accurate statistical data on Kenya’s annual soybean production, but it is estimated to be approximately 3,000–6,000 tons. Assuming a soybean cultivation area of 2 acres (about 0.8 hectares) per farmer and an average yield of 1 ton/ha, Kenya is estimated to have approximately 3,750–7,500 soybean producers. The major soybean production areas include Western, Nyanza, and some eastern provinces, as shown in Figure 4-2.

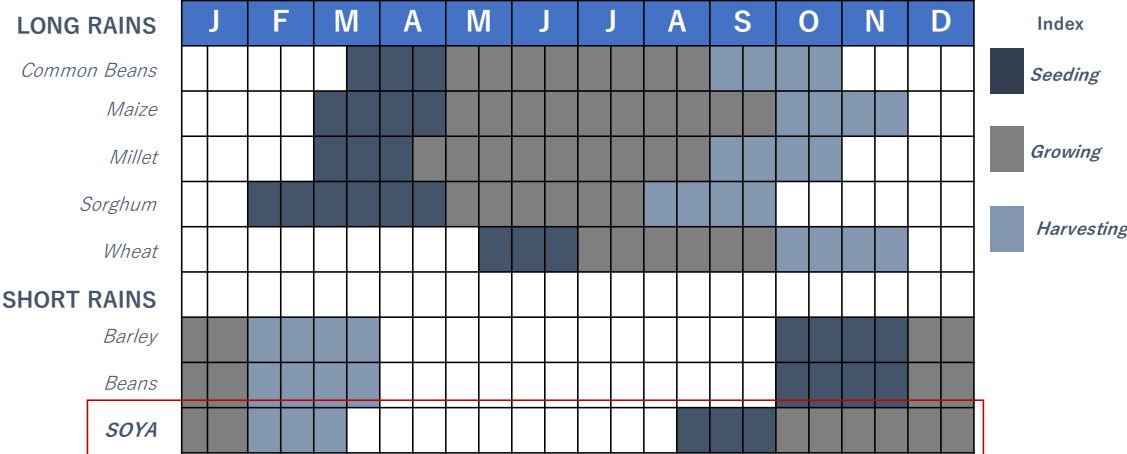


**Figure 4-2: Current soybean production in Kenya**

Source: Tecnoserve (2018)

(2) Cropping calendar of soybeans

Kenya has two rainy seasons, the long and short seasons, with the long rainy season beginning in February and March and the short rainy season beginning in August and September. Soybeans are generally cultivated in the short rainy season, and the time from sowing to harvesting is 120–164 days, depending on the soybean variety, as shown in Figure 4-3.



**Figure 4-3: Cropping calendar of soybeans in Kenya**

Source: Technoserve (2018)

(3) Soybean production practices in Kenya

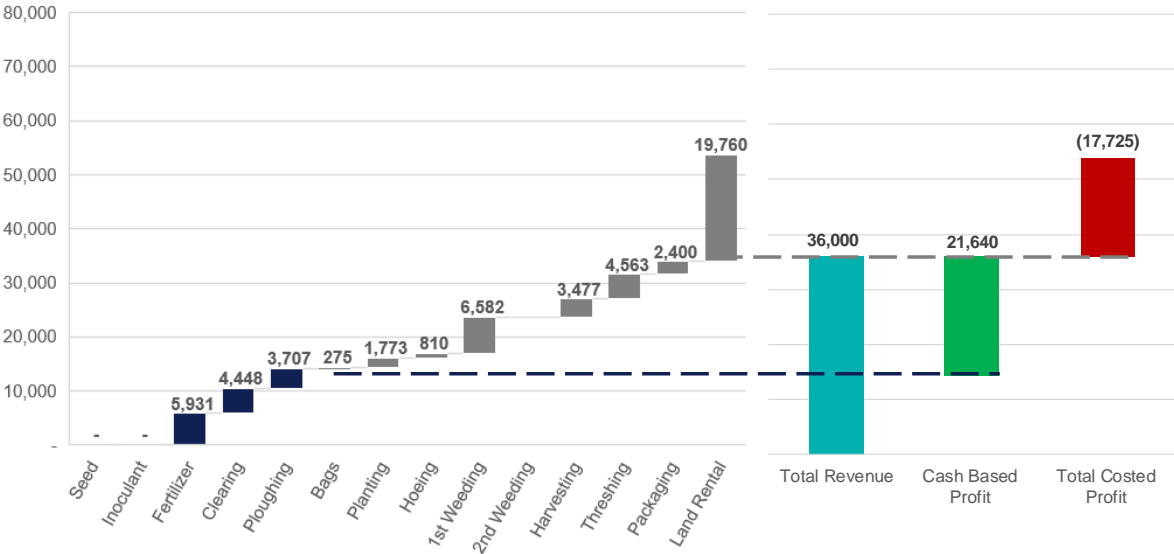
Most soybean producers are small-scale farmers with production scales of approximately 0.1-0.8 ha. However, even on this scale, quite a few farmers have their own land for soybean cultivation. The general soybean cultivation practices are 1) plowing with livestock (or manpower), 2) making rows, 3) fertilizing and seeding, 4) weeding, 5) harvesting, and 6) post-harvesting. Figure 4-4 shows soybean farmers’ income structures, as summarized by Technoserve (2018). The conditions for calculating revenue are shown in Table 4-5. According to Figure 4-4, although a farmer following the conventional model has an income of 36,000 KES/ha, the farmer’s deficit is -17,725 KES/ha when production costs are included. However, the yield is expected to double (72,000 KES/ha) under the improved model (Figure 4-5) due to

the use of improved seeds, an inoculant, and a suitable fertilizer for soybean production; an increased amount of weeding; and so on. In this case, a farmer can achieve a surplus of 8,104 KES/ha even when production costs are taken into consideration. Demand for soybeans in Kenya is very high, and when a farm gate sales price of at least 40 KES/kg can be secured, the improvement of farmers' soybean yields can increase their revenue. Although the analysis shown in the figures assumes a high land lease fee, the soybean farmers in this survey report paying about 10,000 KES/ha/season.

**Table 4-5: Assumptions for calculating soybean production revenue and sales in Kenya**

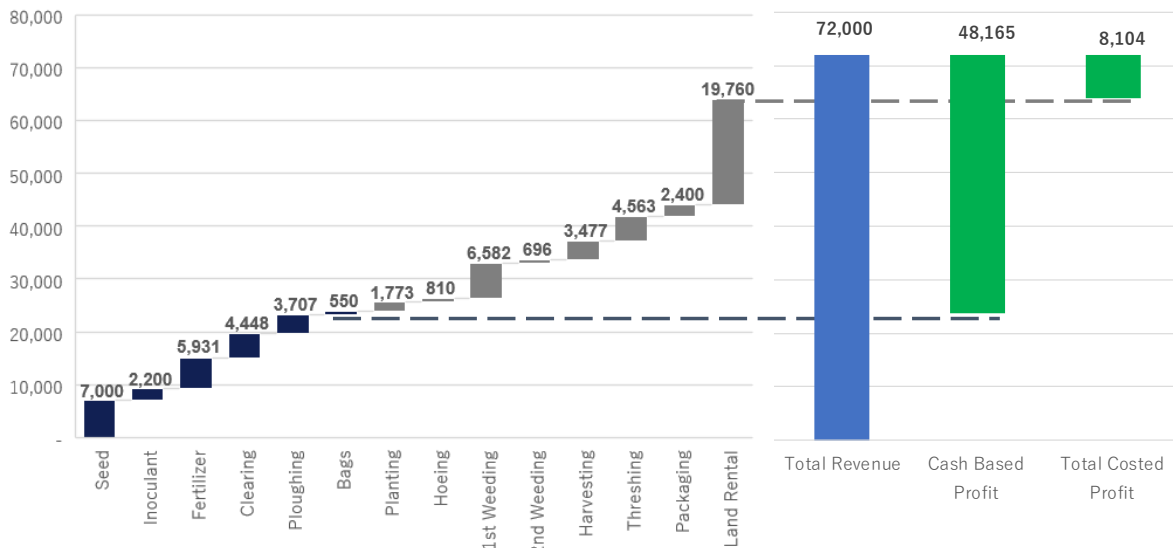
Assumptions for calculations		Revenue (conventional model)	Revenue (improved model)
Assumptions regarding inputs and production	Seeds	Recycled seeds	SB Squire
	Inoculant	No use	Biofix
	Fertilizer	DAP	Fertilizer produced by Sympal
	Weeding	Once per season	Twice per season
	Agricultural chemicals	No use	No use
Assumptions regarding yield and sales price	Yield	1 ton/ha	2 ton/ha
	Post-harvest loss	15%	15%
	Farm gate price	40 KES/kg	40 KES/kg

Source: Technoserve, 2018; Soy Industry Strategic Plan



**Figure 4-4: Revenue structure of soybean producers in Kenya (conventional model)**

Source: Technoserve (2018)

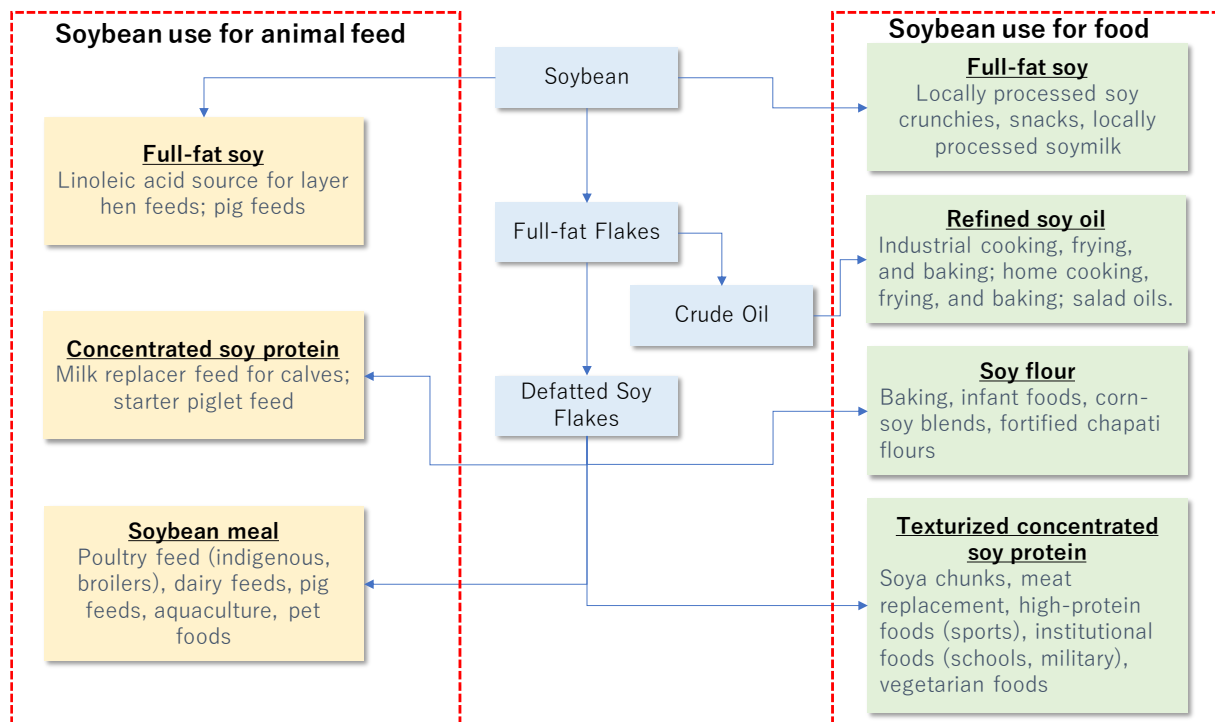


**Figure 4-5: Revenue structure of soybean producers in Kenya (improved model)**

Source: Technoserve (2018)

#### 4.2.4. Processing

Soybean processing in Kenya is largely classified into 1) livestock feed and 2) food for humans. Three types of livestock feed are produced: full-fat soybeans, concentrated soybean protein, and soybean meal. These types are manufactured for specific uses for different livestock and growing periods. Several food products are produced for humans, including snacks, soybean milk, soybean oil, soybean flour, and textured soybean protein. Figure 4-6 provides more details.



**Figure 4-6: Soybean processing in Kenya**

Source: Technoserve (2018)

Soybean feed is shipped to traditional small-scale poultry farmers (44%), laying hen farmers (26%), dairy farmers (14%), broilers (9%), and pig farmers (7%). Approximately 80% of the demand for soybean feed comes from the poultry industry. Major feed manufacturers, small and medium feed manufacturers, and local dairy cooperatives supply 60%, 30%, and 10% of feed, respectively. Among the edible soybeans distributed in 2017, about 55% were used for soybean oil production, about 36% were used in soybean foods (e.g., pseudo-meat, soybean flour, etc.), and about 9% were supplied to international organizations’ food aid programs. Table 4-6 summarizes the major consumers of edible soybeans. BIDCO and other soybean processing companies essentially aim to procure raw soybean materials from the country, and, in fact, several instances of raw soybean materials being procured through contract farming are confirmed by this survey. However, some companies gave up procuring raw materials through contract farming owing to frequent side-sales to other markets by contracted farmers. It can be said that the supply chain of domestically produced soybeans to soybean buyers, such as oil extraction companies, remains unstable.

**Table 4-6: Major actors in soybean food production and sales in Kenya**

Segment	Major Actors	Products	Soybean-buying Behavior
Edible oil refineries	BIDCO	Refined soy oil for home consumption and industrial cooking	Historic willingness to source locally at prices up to 50–55 KES/kg with seasonal purchasing at 30–40 KES/kg
Soy food processors	Promasidor, Proctor & Allen, Classic Foods, Equatorial Nuts	concentrated soy protein foods (e.g. vegetarian foods, soy drinks),	Historic willingness to source locally at prices up to 50–55 KES/kg with seasonal purchasing at 30–40 KES/kg
Soy crushers	Soy Afric, ProSoya	Fortified corn-soy blends; baby foods	Regional sourcing from COMESA neighbors at 32–40 KES/kg
International donors	World Food Program	Fortified corn-soy blends	No grain sourcing – processed fortified soy foods typically imported from European partners

Source: Technoserve, 2018, Soy Industry Strategic Plan

4.2.5. Distribution

Many actors are involved in the soybean distribution chain, which can be roughly classified as 1) collection and sales by middlemen, 2) collection and sales by agricultural cooperatives, and 3) contract farming. In the case of collection and sales by middlemen, individual farmers transport soybeans to collection points set up by middlemen, who buy the soybeans and sell them to their customers. In the case of collection and sales by agricultural cooperatives, an agricultural cooperative collects soybeans and sells them directly to consumers or to other middlemen. Although there are few examples in Kenya, contract farming is carried out in some areas. However, in some cases, farmers or buyers gave up contract farming owing to frequent violations

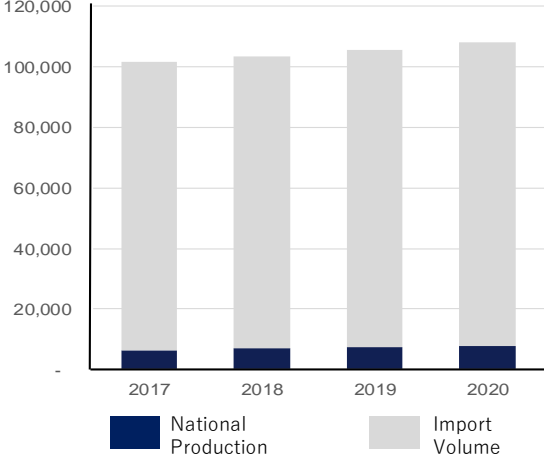


of the rules mentioned in their contracts. Some agricultural cooperatives and distributors keep soybeans in storage and sell them when soybean prices rise. In recent years, various private companies and donor agencies have provided platform services to match producers and buyers, and soybean transactions through these services have been increasing.

4.2.6. Import, export, and domestic markets

(1) Imports and exports

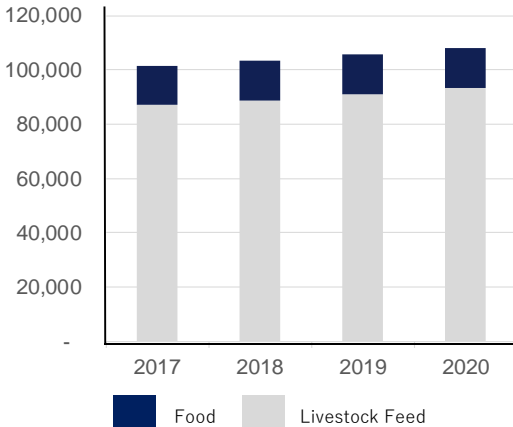
As mentioned above, Kenya's soybean production is estimated to be around 3,000–6,000 tons/year, which is insufficient to meet domestic demand. Thus, Kenya depends largely on imports. Figure 4-7 shows estimated domestic soybean production and imports from 2017 to 2020. The total demand for soybeans in 2017 was about 101,000 tons, and domestic production accounted for only about 3–6% of the total. Soybeans are mainly imported from neighboring countries, such as Uganda, Malawi, and Togo.



**Figure 4-7: Soybean production and imports (tons) in Kenya**  
Source: Technoserve (2018)

(2) Domestic market

Figure 4-8 shows actual soybean consumption in 2017 and projections for 2018–2020. In 2017, approximately 87,100 tons of soybeans were consumed as livestock feed, and the rest were consumed as food, such as soybean oil and soybean flour. Although soybean consumption tends to increase every year owing to population growth, the demand for soybeans as livestock feed is expected to increase, whereas the demand for soybeans as food is not expected to change significantly.



**Figure 4-8: Soybean consumption in Kenya**  
Source: Technoserve (2018)

4.2.7. Policies and the role of the government

“Soybean Production and Marketing in Kenya (2011–2014)” is a policy focusing on soybean promotion. The objective of this policy is import substitution through soybean promotion because the consumption of cooking oil will increase in response to population growth in Kenya,

and the demand for livestock feed will increase further in the future, but most of the necessary amount of soybeans is imported. The six pillars of the policy are as follows.

1. Increase soybean production and acreage to 135,000 ha in Kenya by 2014 to 1) increase the competitiveness of domestic soybean production in terms of production costs and grain quality and 2) improve soybean farmers' income.
2. Improve capacity for production, marketing, and utilization
3. Improve and support soybean processing at the community and industrial levels.
4. Strengthen the institutional capacity to develop appropriate technology interventions to enhance soybean productivity.
5. Review policies, legal frameworks, and enforcement and develop a framework and instruments for strengthening institutional capacity.
6. Increase private sector participation in soybean development strategies and initiatives.

About eight years have passed since this policy was formulated, and it has already expired. However, the action plan to realize this policy has hardly been implemented, partly because 684.8 million USD were allocated for this policy, which is unrealistic. Although the need for import substitution to increase the domestic production of soybean-related commodities is well understood, more realistic targets should be set.

#### 4.2.8. Issues and opportunities

The issues and opportunities of soybean VC development in Kenya are summarized as follows.

##### (1) Issues

A primary issue is Kenya's low soybean production. Multiple factors may be driving this low production, but the main ones are (1) a lack of access to seeds, (2) a lack of access to water, (3) high production costs, and (4) unstable soybean market prices. Soybean seeds are difficult to obtain even in Nyanza Province, a soybean growing area, and even though Kenya has private soybean seed-producing companies. The use of recycled seeds is considered to be the cause of poor seed germination, poor growth due to pests and diseases, low yields, and high harvest-loss rates due to pod shattering. Many farmers cultivate soybeans under rainfed conditions, and low yields can result if the optimum time for soybean seeding is missed. Unstable production also arises owing to a lack of irrigation facilities. In recent years, some farmers have cultivated soybeans as a secondary crop for irrigated rice, but, at present, such cultivation is not expected to expand because rice has higher yields and sales prices than soybeans have. Because the market price of soybeans increases gradually after the major harvest season, some distributors store soybeans purchased from farmers and sell them when the market price rises. However, facilities

where large amounts of soybeans can be stored are limited, and, in many cases, soybeans are sold immediately after harvesting.

(2) Opportunities

Soybeans have great potential for import substitution. Currently, only about 3–6% of domestic demand can be supplied by domestic producers. However, because domestic soybean buyers, such as soybean food processors, have positive feelings about handling domestically produced soybeans, soybeans’ sales potential is expected to be high. In Kenya, digital platforms, such as DigiFarm (Safaricom; 1.1 million registrations), E-Granary (Eastern Africa Farmers Federation (EAFF); 300,000 registrations), and the Farm to Market Alliance (FtMA; 70,000 registrations) are already popular. Through these platforms, farmers have begun to benefit from improved access to funds and inputs and from market expansions. Thus, these platform services are expected to contribute to the expansion of soybean production areas. However, rainfed soybean production is still very unstable, and the development of irrigation facilities is important from a long-term perspective. Table 4-7 shows a strengths, weaknesses, opportunities, and threats (SWOT) analysis for soybeans in Kenya.

**Table 4-7: SWOT analysis regarding soybeans in Kenya**

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>● In particular, Western and Nyanza Provinces have suitable climatic conditions for soybean production.</li> <li>● Soybeans are a promising rotation crop.</li> <li>● Several digital platform services targeting soybeans are offered.</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>● The agricultural work of small-scale farmers is largely not mechanized, and their efficiency is poor.</li> <li>● Access to inputs (especially seeds) is very poor.</li> <li>● Smallholder soybean production and post-harvest processing technology levels are low and need to be improved.</li> <li>● Soybean producers are often dependent on rainfed water. Production is unstable owing to a lack of irrigation facilities.</li> <li>● Storage facilities are limited.</li> <li>● Traceability is lacking, creating high risk for soybean consumers who place importance on traceability.</li> <li>● Domestic demand for soybean food is limited.</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>● Domestic demand for soybean-related products is strong. In particular, the demand for livestock feed is rapidly increasing.</li> <li>● Affected by increased demand, farm gate prices for soybeans are also increasing.</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>● Rainfall may be unstable (impact of climate change).</li> <li>● Cheap soybean imports from neighboring countries may increase.</li> </ul>

Source: The Survey Team

### 4.3. Avocado VC

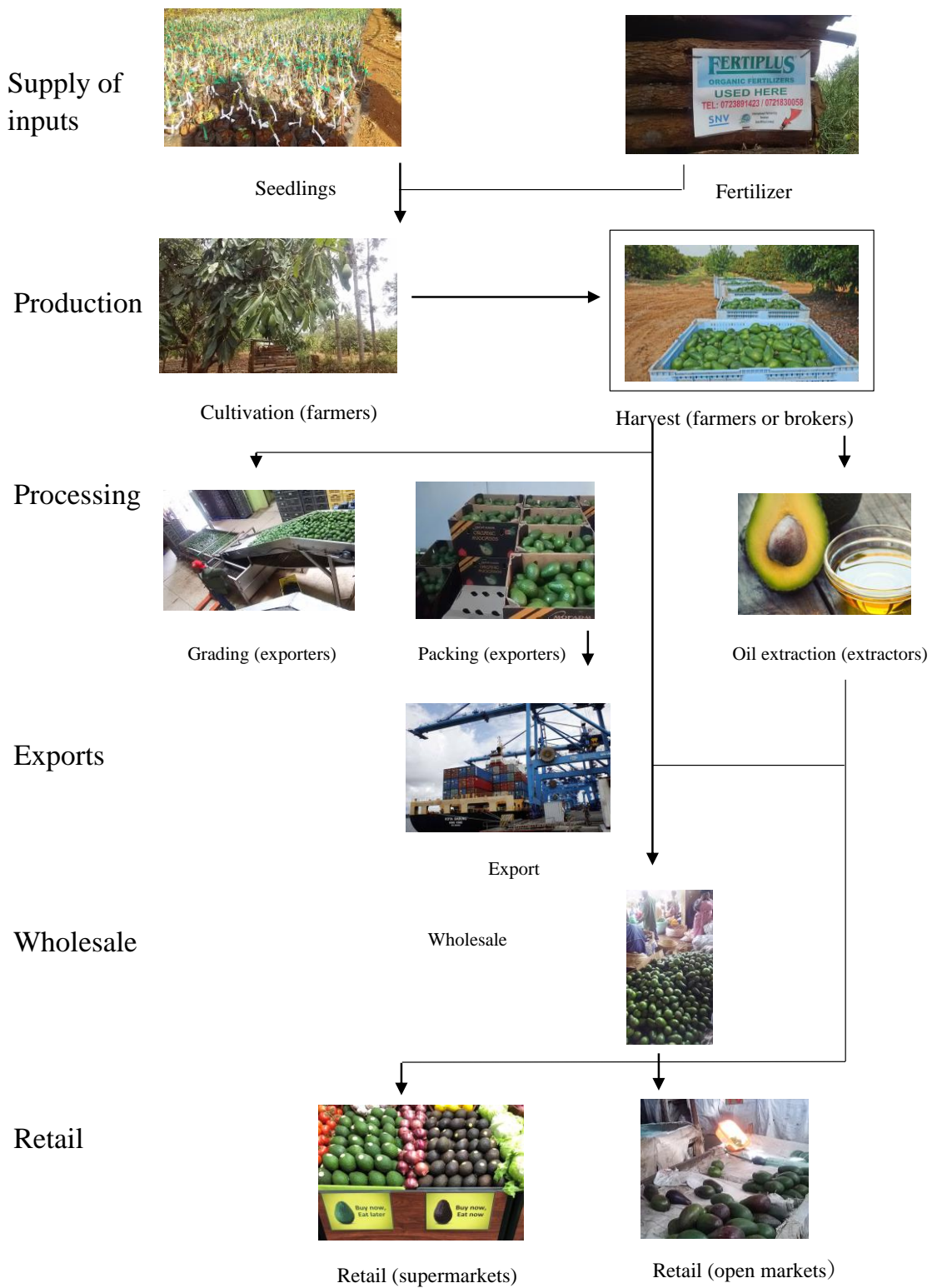
#### 4.3.1. Overview

Figure 4-9 shows an overview of the avocado VC in Kenya. About 25% of avocados produced in Kenya are exported, and all of Kenya's exported avocados are of the Hass variety. The major avocado production sites in Kenya are Murang'a and Kiambu Counties in the central region and Kisissi, Myamira, and Boomet Counties in the western region. Avocado seedlings are available at agricultural input shops, which are located in many rural areas in Kenya, but many farmers face difficulties obtaining high-quality seedlings, except in the Central Region, which is a major avocado production site. Pests and diseases are not serious problems for avocado production in Kenya, and many farmers grow avocados organically. Many avocado exporters in Kenya organize groups of farmers as out-growers and require them to obtain GLOBALG.A.P certification. A major destination of exported avocados is the EU. Table 4-8 shows the prices of avocados at each stage of the VC.

**Table 4-8: Prices of Kenyan avocados**

Farm gate prices (Murang'a County)	For export	44 JPY/kg	(1 KES = 1.09 JPY)
	For processing	27 JPY/kg	(1 KES = 1.09 JPY)
	For the domestic market	14 JPY/kg	(1 KES = 1.09 JPY)
Domestic retail price		55–109 JPY/kg	(1 KES = 1.09 JPY)
Selling price of exporters (free on board)		193 JPY/kg	(1 EUR = 118.9 JPY)
Retail price at foreign markets (Netherlands)		1,180 JPY/kg	(1 EUR = 118.9 JPY)

Source: The Survey Team



**Figure 4-9: Overview of the avocado VC in Kenya**

Source: The Survey Team

#### 4.3.2. Agricultural inputs

##### (1) Seedlings

Avocado seedlings are available at private nurseries<sup>2</sup>, which are located in many rural areas in Kenya. However, many farmers face difficulties obtaining high-quality seedlings and instead purchase low-quality seedlings, except in the Central Region, which is a major avocado production area<sup>3</sup>. Seedlings of Hass avocados are priced at 80–100 KES at nurseries certified by the Ministry of Agriculture, Livestock and Fisheries (October 2019).

## (2) Fertilizers and pesticides

Fertilizers and pesticides are available at agriculture input shops, which are located in many of Kenya’s rural areas. Pests and diseases are not serious problems for avocado production in Kenya, and many farmers grow avocados organically<sup>4</sup>. However, codling moths and fruit flies cause some damage in high-precipitation areas<sup>5</sup>.

Most small farmers use organic fertilizer, which can be purchased from shops or obtained from their own livestock, for avocado trees. Supplies of and information about fertilizers that are suitable for avocado trees are limited<sup>6</sup>.

Table 4-9 shows the annual input and labor costs for organic avocado cultivation at the Esta Kamau Farm in Murang’a County.

**Table 4-9: Annual input and labor costs for the organic cultivation of avocados at the Esta Kamau Farm in Murang’a County (cultivation area: 2.25 acres)**

Input	Maker	Annual cost (KES)	Description
Organic fertilizer	Fertiplus	18,000	Ten 25-kg bags provided twice a year. The cost of one bag is 1,800 KES.
Organic pesticide	APEX	10,000	Ten liters of pesticide per year. The cost is 1,000 KES per liter.
Pheromone trap	Not known	30,000	Five traps per month. The cost of one trap is 500 KES.
Labor costs		192,000	Two laborers at a cost of 8,000 KES per month.

Source: Based on an interview with Esta Kamau Farm in Murang’a County

### 4.3.3. Production

#### (1) Overview of avocado production in Kenya

Table 4-10 shows trends in annual avocado production by country. As the global demand for avocados grew, global production increased between 2012 and 2017. Mexico was responsible for

<sup>2</sup> For example, Murang’a County has 55 registered nurseries and many non-registered nurseries (July 2019).

<sup>3</sup> Kenya Crops and Dairy Market System (KCDMS) “Avocado Value Chain Assessment September 2018” and an interview with the Ministry of Agriculture.

<sup>4</sup> Based on interviews with the Department of Agriculture, Irrigation, Food, Livestock and Fisheries in Murang’a County.

<sup>5</sup> Based on an interview with the Ministry of Agriculture, Livestock and Fisheries.

<sup>6</sup> Based on interviews with the Ministry of Agriculture, Livestock and Fisheries and farmers in Murang’a County.

about 30% of global production. Kenya ranked seventh in the world in avocado production, and its production quantity increased about 17% between 2012 and 2017.

**Table 4-10: Trends in annual avocado production by country (tons)**

	2012	2013	2014	2015	2016	2017
Mexico	1,316,104	1,467,837	1,520,695	1,644,226	1,889,354	2,029,886
Dominican Republic	290,011	387,546	513,961	526,438	601,349	637,688
Peru	268,525	288,387	349,317	367,110	455,394	466,758
Indonesia	294,200	289,901	307,326	382,530	304,938	363,157
Colombia	255,384	294,997	288,739	309,852	294,389	314,275
Brazil	159,903	157,482	156,699	180,652	196,422	213,041
<b>Kenya</b>	<b>166,948</b>	<b>177,799</b>	<b>218,692</b>	<b>136,420</b>	<b>176,045</b>	<b>194,279</b>
Venezuela	116,964	112,670	121,576	128,601	130,290	133,922
Chile	160,000	165,000	160,000	148,459	140,558	133,636
USA	238,495	166,106	179,124	207,750	124,860	132,730
Guatemala	94,605	103,698	108,214	115,099	122,184	125,596
China	108,000	112,000	116,000	118,203	122,875	124,110
Israel	77,500	80,000	91,035	93,000	101,500	110,000
South Africa	91,603	83,718	107,176	86,189	89,440	62,840
<b>World</b>	<b>4,405,855</b>	<b>4,632,934</b>	<b>5,037,461</b>	<b>5,293,399</b>	<b>5,614,649</b>	<b>5,924,398</b>

Source: FAOSTAT

Kenya's climate and soil are suitable for avocado production except in a small part of the eastern region with high temperatures<sup>7</sup>. As shown in Table 4-11 and Figure 4-10, the major avocado production sites in Kenya are Murang'a and Kiambu Counties in the Central Region and Kisissi, Myamira, Boomet Counties in the Western Region. Some eastern areas of Kenya, such as Taita Taveta County, are suitable for avocado production, but avocado cultivation has not yet drawn attention in these areas, and their avocado production volumes are small.

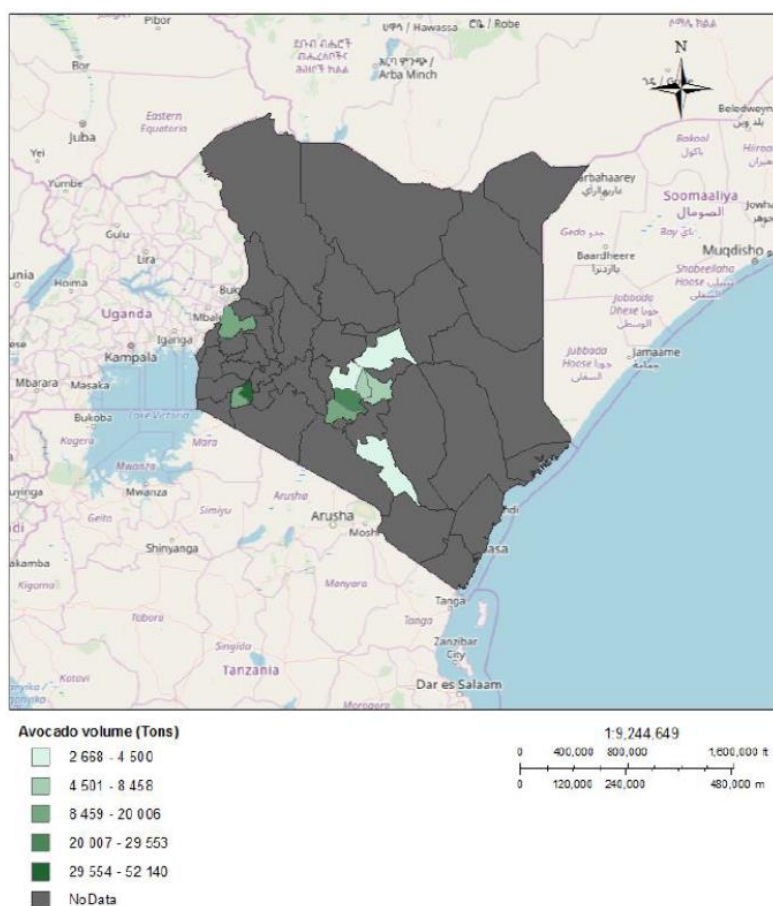
<sup>7</sup> KCDMS "Avocado Value Chain Assessment September 2018" and an interview with the Ministry of Agriculture.

**Table 4-11: Avocado production by county (2018)**

County	Harvest area (ha)	Production quantity (Tons)	Production value (KES)	Proportion of production value (%)
Murang'a	4,321	123,555	2,543,873,660	42.6
Kiambu	1,819	37,964	682,031,000	11.4
Kisii	1,532	28,830	429,530,000	7.2
Nyamira	1,482	29,280	309,280,000	5.2
Bomet	474	10,590	217,800,000	3.6
Embu	709	14,543	216,525,000	3.6
Meru	755	8,553	209,966,667	3.5
Bungoma	299	6,028	201,320,000	3.4
Kirinyaga	367	5,892	147,040,000	2.5
Nyeri	584	5,784	112,702,064	1.9
Makueni	335	3,078	100,187,500	1.7
TaitaTaveta	180	9,183	85,129,940	1.4
Vihiga	389	4,554	83,705,000	1.4
E Marakwet	371	3,493	80,950,035	1.4
Homabay	299	2,061	71,070,000	1.2
Migori	315	3,284	67,684,200	1.1
Nandi	127	2,073	56,581,000	0.9
Baringo	202	2,760	56,000,000	0.9
Kericho	93	1,554	45,885,000	0.8
Nakuru	371	1,664	42,140,000	<b>0.7</b>
Narok	155	1,519	34,130,009	<b>0.6</b>
Machakos	298	2,280	33,925,000	<b>0.6</b>
Others	713	6,280	76,964,153	<b>1.3</b>
<b>Total</b>	<b>16,501</b>	<b>318,087</b>	<b>5,972,104,428</b>	<b>100</b>

Source: Ministry of Agriculture, Livestock and Fisheries, "2018-2019 Validated Horticulture Data Report"





**Figure 4-10: Avocado production by county (2014)**

Source: ReSAKSS

## (2) Production scale

Most of Kenya’s avocado farmers are small-scale farmers. Farmers who own less than 0.25 acres cultivate 95% of Kenya’s total avocado harvesting area<sup>8</sup>, and marginal farmers who plant fewer than 20 avocado trees produce 70% of all avocados<sup>9</sup>. Nevertheless, a number of commercial farmers own more than 10 hectares, and they produce about 10% of avocados<sup>10</sup>. Additionally, there are several large-scale commercial farmers, such as Keitt, which farms 400 hectares of avocado, and Kazuki, which farms more than 1,000 hectares.

## (3) Avocado buyers

Total avocado production in Kenya was 194,279 tons in 2017, and 51,507 tons (about 25%) of avocados were exported<sup>11</sup>. All exported avocados are of the Hass variety. This variety is predominant in the world’s export markets because it has thick skin and, thus, is easy to deliver

<sup>8</sup> Estimated by the Ministry of Agriculture.

<sup>9</sup> KCDMS “Avocado Value Chain Assessment September 2018”

<sup>10</sup> KCDMS “Avocado Value Chain Assessment September 2018”

<sup>11</sup> FAOSTAT

and because it is easy to determine the right time to eat Hass avocados because their skin turns black as they ripen. The Fuerte and Bacon varieties, which have soft skin, are also widely produced in Kenya, but they are consumed in the domestic market rather than exported.

Table 4-12 shows the distribution of avocado uses and the farm gate prices for each use in Murang'a County. In this county, where avocado production is advanced, about half of the avocados produced are exported, and the farm gate price of avocados for export is much higher than that of avocados for other uses. Additionally, post-harvest losses are quite high because of the unavailability of harvest equipment (such as crates and harvesting scissors), improper harvest timing, and improper post-harvest handling.

**Table 4-12: Distribution of avocado uses and the farm gate prices for each use in Murang'a County**

Intended use	Proportion (%)	Farm gate price (KES/avocado)
Post-harvest loss	20	-
Exports	50	8.0
Domestic markets	25	2.5
Processing (oil extraction)	5	5.0

Source: Estimation of Department of Agriculture, Irrigation, Food, Livestock and Fisheries, Murang'a County

Kenyan avocados are usually smaller than those of competitor nations (e.g., Mexico, Chile, Peru, and Israel), and their unit price is lower than those of these competitors (Table 4-13). The major reasons for the lower quality of Kenyan avocados are small-scale production, low-skilled cultivation and post-harvest handling, and the lack of infrastructure (e.g., irrigation and roads).

**Table 4-13: Quantity, value, and unit price of avocado exports by country**

Country	Quantity of exports (tons)	Value of exports (1,000 USD)	Unit price (Value of exports/quantity of exports. USD/kg)
Mexico	896,557	2,901,063	3.24
Peru	247,363	581,229	2.35
Chile	177,236	479,290	2.70
USA	50,907	152,283	2.99
Kenya	51,507	78,020	1.51
Israel	33,419	69,373	2.08
Colombia	28,487	52,948	1.86
<b>World</b>	<b>2,064,455</b>	<b>5,987,508</b>	<b>2.90</b>

Source: FAOSTAT

#### (4) Formation of farmers' groups

When avocados are exported to Europe, North America, or the Middle East, the exporters are required by their buyers to obtain GLOBALG.A.P. certification. In response, many avocado exporters in Kenya form farmers' groups for their out-growers to obtain GLOBALG.A.P. certificates as groups<sup>12</sup>. As obtaining these certificates is highly costly, they are difficult for small farmers to obtain. However, when the exporters organize farmers' groups, the exporters bear all the costs of obtaining the certificates.

The contents of the contracts between exporters and out-growers vary across different exporters. For example, Mofarm Ltd. negotiates its purchasing price with out-growers before harvest, whereas Keitt Exporters Ltd. does not set pre-determined prices but rather buys at spot prices. In most cases, out-growers' avocados are harvested by exporters<sup>13</sup>. Additionally, most exporters hire cultivation experts and provide technical services to out-growers.

#### 4.3.4. Processing

##### (1) Grading and packing

Avocados for export are delivered to exporters' pack houses for grading and packing. Kenya has more than 150 registered avocado exporters<sup>14 15</sup>. There are a number of pack houses in the central and western parts of Kenya, which are major avocado production sites, but there are fewer in other areas. It is therefore difficult for farmers in other areas to sell avocados for export, as pack houses with refrigerators are required for exporting avocados.

In 2019, 50 avocado exporters formed the Avocado Exporters Association. This association has not yet begun any activities, but it plans to lobby the government<sup>16</sup>.



Grading and packing avocados at a Mofarm Ltd. pack house

##### (2) Oil extraction

There are four avocado oil-extracting firms in Murang'a County and at least one oil-extracting

<sup>12</sup> According to the Department of Agriculture, Irrigation, Food, Livestock and Fisheries in Murung'a County, about 7% of avocado farmers are organized as out-growers of exporters.

<sup>13</sup> In the case of East Africa Grower, out-growers harvest and deliver avocados by themselves.

<sup>14</sup> Based on an interview with KALRO.

<sup>15</sup> Murung'a County has 40 registered avocado exporters (according to the Ministry of Agriculture in Murung'a County).

<sup>16</sup> Based on an interview with Seipei Ltd.

firm in Nairobi. The avocado oil that is extracted by these firms is consumed in the domestic markets as edible oil and is exported to Europe as edible oil and as a raw material for cosmetic products. Kenyan avocado oil brands are not very powerful in the European markets.

#### 4.3.5. Distribution

Most of the distribution of avocados from small farmers is conducted by so-called “brokers,” which are intermediators. After the brokers visit small farmers and purchase avocados, they harvest and grade them. They then deliver them to exporters or wholesalers. As there is fierce competition among brokers to purchase avocados, they tend to harvest early, and many avocados are therefore harvested before they mature. These premature avocados tend to be smaller than mature avocados. Moreover, harvest and post-harvest handling by brokers is quite poor in many cases, and they do not have refrigerated facilities, meaning that the post-harvest loss in the distribution process is quite large<sup>17</sup>.

The distribution of avocados produced by out-growers of exporters is conducted by exporters in most cases, and the avocados are delivered by refrigerated trucks in many cases. The avocados packed by exporters are also delivered by refrigerated trucks to the ports and are stored in refrigerators at the ports until they are shipped.

In contrast, refrigerated facilities are not used for the distribution of avocados that are consumed domestically.

#### 4.3.6. Imports, exports, and the domestic market

##### (1) Exports

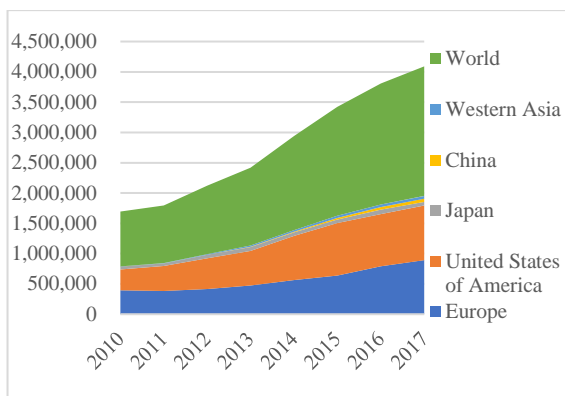
##### 1) Major destinations of exports

As the global demand for avocados grows, avocado exports from all countries have recently increased (Figure 4-11). About half of avocado exports go to Europe and the USA, but exports to West and East Asia (i.e., China and Japan) have been increasing. Exports of Kenyan avocados have also increased significantly (Figure 4-12). The value of avocado exports constitutes about 85% of the total value of Kenya’s fruit exports (2016-2018)<sup>18</sup>.

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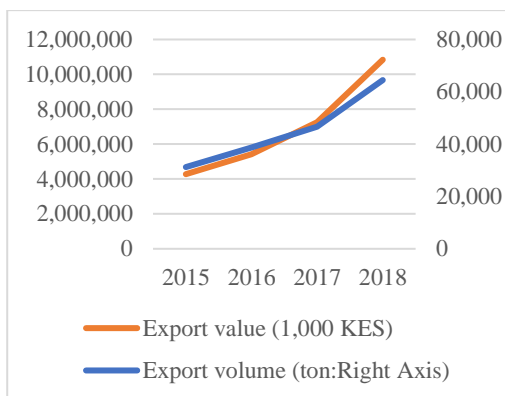
<sup>17</sup> Based on interviews with the Ministry of Agriculture, Mofarm, and Seipei.

<sup>18</sup> 2018-2019 Validated Horticulture Data Report, Ministry of Agriculture.



**Figure 4-11: Trends in avocado imports by region (ton)**

Source: FAOSTAT



**Figure 4-12: Trends in avocado exports from Kenya**

Source: FAOSTAT

As shown in Table 4-14, most avocado exports from Kenya go to Europe, but some go to the Middle East and Russia.

**Table 4-14: Distribution of the value of avocado exports from Kenya by country (2017)**

Country	Proportion (%)
Netherlands	22
Great Britain	17
France	16
United Arab Emirates	10
Saudi Arabia	6
Russia	4
Other	25

Source : Brief of the Avocado Industry in Kenya Revised, Ministry of Agriculture, Livestock and Fisheries

Most exports of avocados from Kenya are carried out by container ships<sup>19</sup> from Mombasa port, but a small volume is sent by air to European markets<sup>20</sup>.

Most avocado exporters ship about one container of avocados per shipment, and, thus, the cost of delivery is quite high<sup>21</sup> <sup>22</sup>. If exporters can ship more than two containers at a time, the

<sup>19</sup> Delivery is done by reefer containers that have refrigerated facilities.

<sup>20</sup> Based on an interview with Keitt Ltd.

<sup>21</sup> Based on interviews with Mofarm and Seipei. Ltd.

<sup>22</sup> The cost of shipping from Mombasa port to Europe is about 5,900 USD per container, which is almost the same as that of shipping from Chile to Europe and much higher than that of shipping from Mexico to Europe (about USD 3,000 per container).

shipment costs decrease, as there is a discount and the shipment cost as a proportion of total costs becomes relatively smaller. Thus, shipment costs are not a big problem for large-scale exporters<sup>23</sup>.

## 2) New export markets

After a long import approval process, an agreement to export Kenyan avocados to China was signed in 2019, and the export of Kenyan avocados to China began in September 2019. Some experts state that China's potential demand for avocados constitutes about 40% of Kenya's total avocado production<sup>24</sup>.

In September 2019, Chinese customs only approved imports from Kenya of frozen avocados whose skins and seeds were removed. As Kenya's interest rates are quite high, it is difficult for many exporters to introduce freezers to export avocados to China<sup>25 26</sup>.

The export of Kenyan avocados to Japan is not approved owing to the risk of contamination by European flies. In 2019, the government of Kenya<sup>27</sup> delivered a request letter to remove this ban on avocado exports to the Plant Health Department of Japan's Ministry of Agriculture, Livestock, and Fisheries, and negotiations to identify pests and diseases on both sides are expected to begin soon<sup>28</sup>.

## (2) Domestic market

All of the avocados produced in Kenya except for Hass avocados are consumed domestically. The retail price of an avocado in Kenya is 50–100 KES (July 2019), which is quite high relative to other fruits and vegetables. However, avocados are gaining popularity as healthy foods, and demand in the domestic market has been increasing<sup>29</sup>. The volume of avocado consumption in Kenya between 2013 and 2016 has been around 130,000 tons per year.

### 4.3.7. Policy and the role of the government

Owing to the increase in the global demand for avocados and the expectation that new markets, such as China, will be explored, the Ministry of Agriculture, Livestock and Fisheries is currently in the process of formulating an Avocado Strategy, which aims to increase Kenya's annual avocado production to 2 million tons by 2030. The details of the Avocado Strategy have not yet been determined, but the following policies are expected to be included:

- Promotion of organized farmers' groups among small farmers (i.e., clusters of small farmers)

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<sup>23</sup> Based on an interview with Keitt Ltd.

<sup>24</sup> <https://www.capitalfm.co.ke/business/2019/04/kenya-avocados-cleared-to-enter-expansive-china-market/>

<sup>25</sup> Based on interviews with Mofarm and Seipei. Ltd.

<sup>26</sup> According to Keitt Ltd., it is easy to purchase refrigerated facilities.

<sup>27</sup> KALRO handled this request letter.

<sup>28</sup> It is likely to take five to ten years from the request to remove the ban to the revmoval of the ban, based on the past records of the negotiation of other countries which requested to remove the ban to the Japanese markets.

<sup>29</sup> KCDMS "Avocado Value Chain Assessment September 2018"

and setting up pack houses for them to process and sell avocados to exporters<sup>30</sup>.

- Promotion of mechanization<sup>31</sup>
- Reinforcement of the management of quality seedlings.

Additionally, the Department of Agriculture, Irrigation, Food, Livestock and Fisheries in Murang'a County is formulating an Avocado Strategy for the county and plans to include the following policies in the strategy:

- Provision of 2 million seedlings of the Hass variety to farmers for free<sup>32</sup>.
- Promotion of farmers' groups among small farmers.
- Setting up pack houses with refrigerators.
- Setting up standards for avocado cultivation, harvesting, and post-harvest handling to avoid harvesting premature avocado fruits.

#### 4.3.8. Issues and opportunities

Table 4-15 shows the SWOT analysis of the avocado VC in Kenya.

##### (1) Issues

The issues in Kenya's avocado VC include the lack of brand power or a competitive edge in international markets. The major reasons for these issues are small scale production; inadequate infrastructure, such as irrigation, roads, and power; and poor harvest and post-harvest handling.

The limited access to quality seedlings, fertilizer, and pack houses in some regions is also a serious issue. Additionally, the increased competitiveness in international markets despite the increase in global demand is a major threat.

##### (2) Opportunities

Opportunities in the avocado VC in Kenya include the suitable climate for avocado production and the existence of vast land area that can be used for avocado tree planting and large quantities of exports. Moreover, government support for avocado cultivation can be expected.

The global demand for avocados is expected to increase in the future, and there are opportunities to explore new markets, such as China and Japan. Even though production of high value-added avocado products is limited at present, there are opportunities to increase it in the future.

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<sup>30</sup> Farmers' groups are expected to obtain certificates. One reason is to avoid broker purchases at unfair prices.

<sup>31</sup> This policy is also consistent with the current agriculture strategy, Agricultural Sector Development Strategy (ASDS) 2010-2020.

<sup>32</sup> This policy is planned to be implemented in 2019.

**Table 4-15: SWOT analysis of the avocado VC in Kenya**

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>● Suitable climate for avocado production</li> <li>● Existence of vast land that can be used for avocado tree plantations</li> <li>● Organic production is not difficult (pests are not a big problem)</li> <li>● Existence of a large number of exporters</li> <li>● Existence of a number of certified farmers' groups organized by exporters</li> <li>● Existence of government support (Avocado Strategy of Ministry of Agriculture, Livestock and Fisheries , provision of seedlings by Murang'a County)</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>● Kenyan avocados lack strong brands in international markets</li> <li>● Lack of competitive edge against, for example, Mexico, Peru, and South Africa, in terms of size, color, and form due to:             <ul style="list-style-type: none"> <li>• Mostly small-scale production</li> <li>• Inadequate infrastructure (e.g., irrigation, roads, and power)</li> <li>• Poor post-harvest management (e.g., inadequate skills and cold chains)</li> <li>• Inadequate R&amp;D activities</li> <li>• High transportation costs for exports due to small volumes (especially for small-scale exporters)</li> </ul> </li> <li>● Low domestic consumption of avocados</li> <li>● Access to credit for investors in farming, exports, and processing.</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>● Increasing demand in international markets (major markets are Europe and the Middle East)</li> <li>● Potential markets in East Asia (China, Southeast Asia, and Japan(?))</li> <li>● Small but increasing demand in the domestic market</li> <li>● Potential to add value by processing to oil</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>● Increasing competition in international markets</li> </ul>

Source: The Survey Team



## 4.4. French bean VC

### 4.4.1. Overview

An overview of the French bean VC is shown in Figure 4-13. In Kenya, French beans are produced by small-scale farmers mainly for export. Cultivation is labor-intensive with less room for mechanization. Almost all of the seeds and fertilizers for French bean cultivation are imported. The products must comply with European countries' maximum residue levels (MRLs) and GLOBALG.A.P., and, thus, proper pesticide application is necessary in cultivation management. French beans are therefore mainly produced by farms that are directly managed by or organized under exporters. Most French beans are exported to European countries in their fresh form. Table 4-16 shows the prices of French beans at each stage of the VC.

**Table 4-16: Prices of French beans in Kenya**

Farm gate price	Fresh French beans for export 60 KES / kg (several exporters)	63	JPY/kg (1 KES= 1.05 JPY)
	Fresh French beans for processed food for export 42 KES/kg (farmer in Murang'a County)	44	JPY/kg (1 KES= 1.05 JPY)
Domestic retail price	Wholesale market 60KES/kg (Wakulima market)	63	JPY/kg (1 KES= 1.05 JPY)
	Retail market 50-80 KES/kg (City park market)	53 - 84	JPY/kg (1 KES= 1.05 JPY)
	Supermarket 89 KES/kg (Taskys)	93	JPY/kg (1 KES= 1.05 JPY)
Export price	2.6 EUR/kg (Meru Greens)	315	JPY/kg (1 EUR= 121 JPY)
Retail price in export destination (UK)	2.68-6.22 GBP/kg (Tesco)	376 - 873	JPY/kg (1 GBP= 140.4 JPY)

Source: The Survey Team



**Figure 4-13: Overview of Kenya's French bean VC**

Source: The Survey Team

#### 4.4.2. Agricultural inputs

##### (1) Seeds

French bean seeds are products of global seed companies that are imported to Kenya, as buyers in the EU or the UK order specific varieties of beans from Kenyan French bean exporters. The most popular variety is Serengeti, produced by Syngenta AG. Simlaw Seed Corporation Limited<sup>33</sup>, Kenya's largest seed company, developed and released two varieties with rust disease resistance, M-66 and M-77, to the market in 2019. The amount of sales by farmers who produce French beans for the domestic market remains small.

##### (2) Fertilizer

In Kenya, companies, such as Toyota Tsusho Fertilizer Africa Limited, Export Trading Group (ETG), Elgon, and Yara, import<sup>34</sup> chemical fertilizer materials, mix the materials, and pack and sell them as final products. Nitrogen, phosphorus, and potassium (NPK) (17 + 17 + 17) and DAP are mainly used for French bean cultivation. Their prices are 2,900 KES/50 kg and 3,500 KES/50 kg, respectively.

Among locally produced fertilizers, chicken manure is used for French bean cultivation. Its price is 500 KES/50 kg, which is far lower than the price of chemical fertilizers. Both chemical fertilizers and chicken manure are available in rural areas.

##### (3) Agricultural chemicals

The major pests affecting French bean production are whiteflies, aphids, and thrips, and pesticides for controlling these pests are available in Kenya. As described in 4.4.3(3), the major export destinations, the EU and the UK, have very strict MRLs, and product rejections occur sometimes. Kenya Agricultural and Livestock Research Organization (KALRO) recommends using Integrated Pest Management (IPM) to minimize chemical pesticide applications.

The pesticides and herbicides that are used in Kenya are mostly imported from China, India, the USA, and the EU. A locally made pesticide is a natural pyrethrum pesticide<sup>35</sup> made by KAPI Kenya Limited.

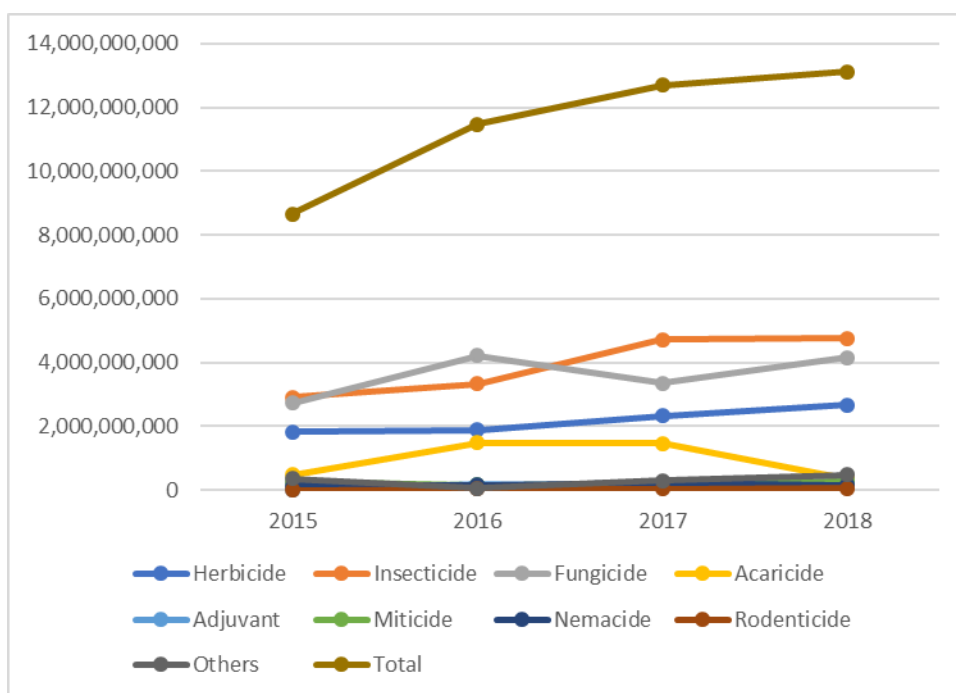
Figure 4-14 shows the amounts of agricultural chemicals imported to Kenya. The amount of pesticides is the largest, followed by those of fungicides and herbicides. The total amount of imported agricultural chemicals increased from 2015 to 2018. Almost all agricultural chemicals are imported, and the area under cultivation in Kenya has not changed. Thus, it is assumed that the amount of agricultural chemicals applied per unit of area increased during this period.

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<sup>33</sup> A subsidiary firm of Kenya Seed Company Limited, which is a state-owned enterprise.

<sup>34</sup> Chemical fertilizer materials are imported from Russia, the USA, Ukraine, China, Romania, and so forth.

<sup>35</sup> Kenya produced 90% of the world's pyrethrum in 1998. <https://en.wikipedia.org/wiki/Pyrethrum>



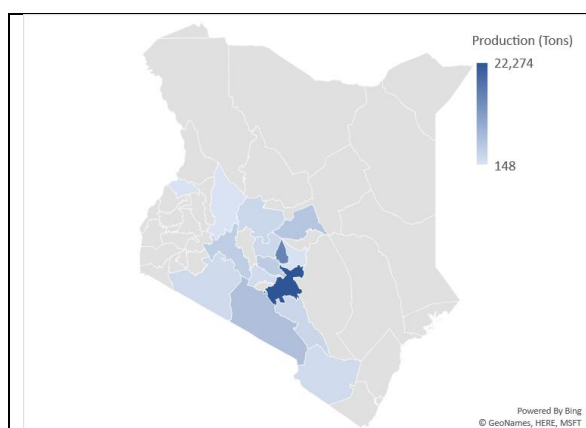
**Figure 4-14: Amount of agricultural chemicals imported to Kenya (KES)**

Source: Agrochemicals Association of Kenya

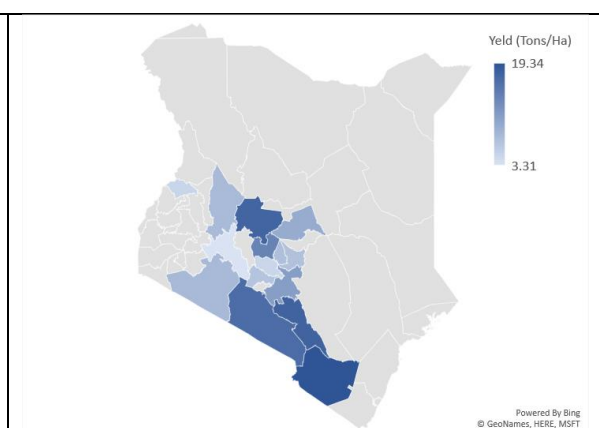
#### 4.4.3. Production

##### (1) Production and production areas

Figure 4-15 and Figure 4-16 show the production volume (tons) and yield (tons/ha) of French beans in major French bean-producing counties. The important statistics, such as production, yield, and the area under cultivation of French beans, are summarized in Table 4-17. The top three counties in terms of production, Machakos, Kirinyaga, and Kajiado Counties, are near Jomo Kenyatta International Airport because French bean products are exported by air.



**Figure 4-15: Volume of French bean production by county in Kenya in 2018 (tons)**



**Figure 4-16: Yield of French beans by county in Kenya in 2018 (tons/ha)**

Source: Agriculture and Food Authority, Kenya

**Table 4-17: Important statistics of French bean production in Kenya in 2018**

County	Volume		Area (Ha)	Yield (Tons/Ha)
	(Tons)	(% of total)		
Machakos	22,274	33.4%	2,003	11.12
Kirinyaga	14,811	22.2%	2,025	7.31
Kajiado	5,740	8.6%	346	16.59
Meru	4,706	7.0%	497	9.47
Murang'a	3,915	5.9%	811	4.83
Nakuru	3,491	5.2%	1,054	3.31
Makueni	2,133	3.2%	121	17.63
Laikipia	2,047	3.1%	117	17.50
Nyeri	1,901	2.8%	135	14.08
Narok	1,485	2.2%	186	7.98
Kiambu	1,384	2.1%	204	6.78
Taita Taveta	1,354	2.0%	70	19.34
Others	408	0.6%	226	1.81
Nandi	374	0.6%	30	12.47
Embu	325	0.5%	46	7.07
Trans Nzoia	271	0.4%	55	4.93
Baringo	148	0.2%	19	7.79
Total	66,765	100.0%	7,942	8.41

Source: Agriculture and Food Authority, Kenya

## (2) Cultivation

French bean cultivation is labor-intensive with less mechanized work. Tractors or power tillers are occasionally used for land preparation before sowing. The average land area for French bean cultivation by small-scale farmers, who engage in contract farming with exporters, is around 0.5 acres, so these farms typically hire agricultural labor for land preparation. The French bean cultivation process is summarized as follows.

- a) Land preparation, base fertilizer application (a mixture of chicken manure and DAP), watering, and sowing
  - a) Fertilizer use is 9 kg/1 kg of seed. Chicken manure costs 500 KES/50 kg. DAP costs 90 KES/kg. Farmers generally buy fertilizer at the market.<sup>36</sup>
  - b) Seeds are provided by Frigoken Ltd. (exporter and processor of French beans). Farmers sow 3 kg of seed per 1/8 acre. The landowner hires two agricultural laborers to sow seeds, spending 300 KES/person/day.
  - c) The farmer pays 100 KES/month to an irrigation group in the area as a water fee.

<sup>36</sup> Fertilizer subsidies are too low for all farmers to benefit. The budgeted amount fluctuates every year, and time passes between application and fertilizer procurement. Many French bean farmers do not rely on fertilizer subsidies.

- b) The seeds germinate four days after sowing. One week later, Frigoken Ltd. sprays a pesticide. The company sprays five times throughout the cultivation period, but no herbicide is used.
- c) Additional fertilizer is applied three weeks after germinating. CAN and NPK (17:17:17) are used. Farmers apply 4 kg of CAN (50 KES/kg) and 9 kg of NPK (70KES/kg) per 1/8 acre.
- d) Products are harvested twice a week for three weeks.
  - a) First week: Landowner and five laborers, who are paid 300 KES/person/day and lunch
  - b) Second and third weeks: Landowner and three laborers
  - c) Farmers harvest 600 kg of French beans per 1/8 acre of land. Frigoken Ltd picks up French beans on each harvest day. The farm gate price is 42 KES/kg.
- e) Profit
  - a) The above process is conducted twice a year.
  - b) The profit from French bean cultivation on 1/8 acres of land in one cycle is approximately 143 USD. Assuming that average farmers cultivate French beans on 0.5 acres of land twice a year, the estimated net profit is 1,144 USD.

### (3) GLOBALG.A.P. and the EU's MRLs

French beans produced in Kenya are mostly exported to European countries and the Middle East. Companies that import Kenyan French beans require export companies to have GLOBALG.A.P. certificates. The EU's Maximum Residue Levels (MRL) standards are high, but some European countries, such as the UK, Germany, and the Netherlands, set even higher standards than those of the EU. The EU's MRL for beans is shown in the EU database<sup>37</sup>.

It is difficult for small-scale farmers to produce French beans in compliance with the EU's MRL and to obtain GLOBALG.A.P. certification. Table 4-18 shows the costs of obtaining GLOBALG.A.P. certification.

**Table 4-18: Costs of obtaining GLOBALG.A.P. certification for an average French bean farmer in Kenya**

Item	Cost
Monitoring	Standard monitoring=350 USD/day x 3 days=1,050 USD Random monitoring=Standard monitoring x 15%=157.5 USD Sub-total=1,207.5 USD
Certification	100 USD
GLOBALG.A.P fee	Open field culture: ≥ 0.5 ha, < 2.0 ha: 4.24 EUR (≅ 4.7 USD) Greenhouse culture: ≥ 0.5 ha, < 1.0 ha: 10.60 EUR (≅ 11.8 USD) * French beans are mostly cultivated in open fields in Kenya.
Total	1,312.1 USD

Source: Interview with Africert

Table 4-18 indicates that obtaining GLOBALG.A.P. certification costs 1,312 USD annually, whereas the net profit of the average French bean farmer is 1,144 USD per year, as shown in the previous section. In addition, it is necessary to hire a consultant to strictly control agricultural practices, particularly pesticide application, according to GLOBALG.A.P. standards, and this cost is not estimated in Table 4-18.

<sup>37</sup> <https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?event=product.resultat&language=EN&selectedID=179>

Thus, it is not realistic for individual small-scale French bean farmers to obtain GLOBALG.A.P. certification, but farmers’ groups face similar issues. Africert, the largest GLOBALG.A.P. certification body in Kenya, has issued GLOBALG.A.P. certificates for about 280 organizations since 2004 (as of September 2019), and only several of these organizations are farmers’ groups. Most of the remaining applications are from exporters organizing contract farmers who produce French beans. Exporters provide seeds and spray pesticides, and farmers are responsible for the remaining cultivation management, that is, land preparation, seed sowing, fertilization, weeding, and harvesting. To produce French beans in compliance with the EU’s MRLs, exporters spray pesticides in many cases. Table 4-19 summarizes the roles and responsibilities of farmers and exporters in French bean production. The table shows that French bean cultivation methods can be roughly divided into three categories: i) farms directly managed by exporters, ii) contract farming between exporters and small farmers, and iii) independent farmers’ groups. Exporters are increasing the production of French beans on their directly managed farms to ensure that the products comply with European countries’ MRLs.

**Table 4-19: Roles of farmers and exporters in French bean production in Kenya**

	Land preparation	Seeding	Fertilization	Pesticide application	Harvesting	Packing	Exporting
Farms directly managed by exporters	Exporter						
Contract farming	Farmer	Exporter	Farmer	Exporter	Farmer	Exporter	Exporter
Independent farmers’ groups	Farmer	Farmer	Farmer	Farmer	Farmer	Exporter	Exporter
		Exporter					

Source: The Survey Team

4.4.4. Processing

French beans that are exported from Kenya are mostly in the fresh form; only a small volume of canned products and French beans in jars are exported. Only two companies, Meru Greens and Frigoken, produce processed French bean products for export. Their factories are located in the Export Processing Zone (EPZ) in Machakos County and in Nairobi, respectively.

According to Meru Green, the market for processed French beans in Europe is so large that the supply by Meru Green and Frigoken does not meet the demand. The two companies obtain the certificates shown in Table 4-20 to export their products to foreign clients.

**Table 4-20: French bean processing companies in Kenya and their certificates**

French bean processing companies in Kenya	Certificates
Meru Greens	International Featured Standards (IFS) Business Social Compliance Initiative (BSCI)

	* Contract farmers have certificates, such as GLOBALG.A.P. or CERES.
Frigoken	British Retail Consortium <sup>38</sup> , IFS, GLOBALG.A.P., ISO14001, ISO22000, Kosher (Frozen products, Ambient products), BSCI

Source: The websites of Meru Greens and Frigoken

#### 4.4.5. Distribution

##### (1) Transportation

In Kenya, no cold chain for transporting French beans exists. French beans that are harvested from the field are collected by exporters on the same day, delivered to a pack house, and exported by air. Farmers' groups often consider building cold storage near their farms, but doing so is difficult because of financial constraints and the lack of electricity. Kiem Gathugu Irrigation Group in Muranga County, a farmers' group that produces French beans, obtained its GLOBALG.A.P. certificate with support from the county office in 2014. They tried to build a storage space with a charcoal cooler that did not require electricity, but it did not materialize owing to budget limitations.

##### (2) Packing

Exporters deliver the collected French beans to a pack house, which is a facility for packing fruits or vegetables, and pack the French beans on plastic trays. There are three methods for utilizing a pack house:

- Own pack house: using one's own pack house
- Other company's pack house: renting a part of another company's pack house
- Government pack house: renting one of the eight pack houses<sup>39</sup> that are owned by the Ministry of Agriculture, Livestock and Fisheries and operated by the Horticultural Crops Directorate, Agriculture and Food Authority

Pack houses are large. Nairobi Horticultural Center, one of the government pack houses, is as large as 30 m × 90 m, meaning that several exporters can use the facility simultaneously. Pack houses owned by large exporters are generally designed based on the size needed during the peak season. Thus, parts of pack houses are often leased to other companies during the low season. Pack houses are usually equipped with cold storage to keep products in good condition until shipping. Figure 4-17 shows pictures of the Nairobi Horticultural Center.

The Survey Team observed that the Nairobi Horticultural Center is well maintained and utilized, and the manager mentioned that the process of obtaining Hazard Analysis Critical

<sup>38</sup> A food security certificate issued by the British Retail Consortium

<sup>39</sup> One government pack house is the Nairobi Horticultural Center. It is located near Jomo Kenyatta International Airport and was established by JICA's project grants. It started operation in 2003, and one pack house is no longer functional as of September 2019.



Control Point certification (HACCP) has been in progress since 2017 and should be completed in November 2019. However, one of the exporters in the facility did not exhibit much care regarding hygiene control, and the workers did not wear masks and gloves while cutting and packing French beans.



Inside the Nairobi Horticultural Center



Cutting off both ends of French beans



Putting the French beans on a tray



Wrapping the tray in plastic wrap



Putting the wrapped tray sideways



Passion fruits are packed on another table.

**Figure 4-17: Packing fruits and vegetables in the Nairobi Horticultural Center**

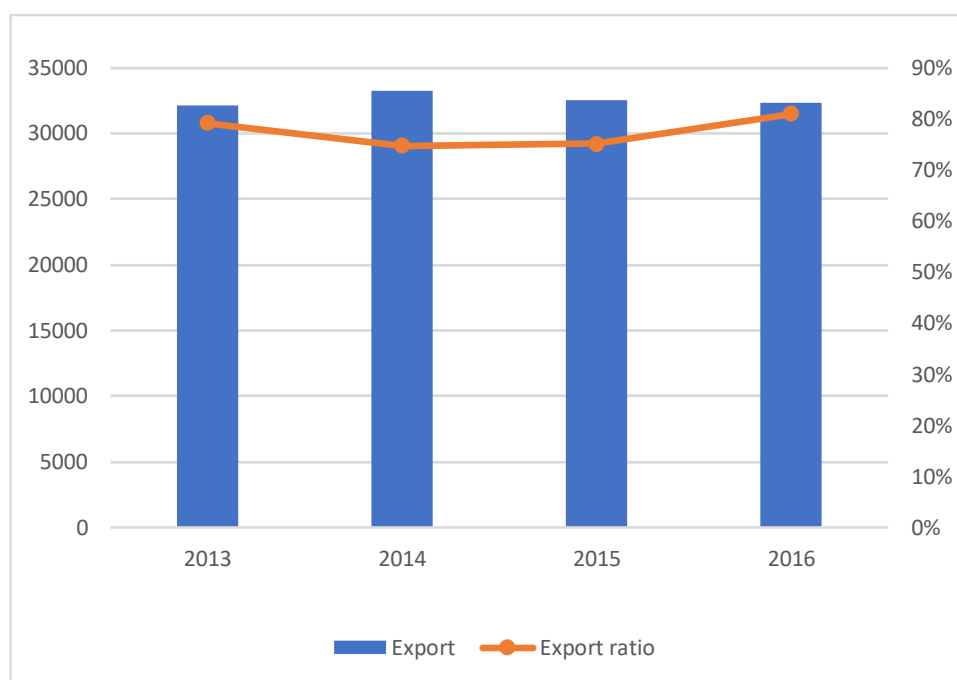
#### 4.4.6. Imports, exports, and domestic market

##### (1) Production and exports of French beans in Kenya

Figure 4-18 shows the volume of green bean<sup>40</sup> production in Kenya and the ratio of the export volume to the production volume. The figure shows that the volume of exported green beans fluctuated between 32,000 and 33,000 tons and that the export ratio shifted around 80% from 2013 to 2016. Several French bean exporters mentioned that the French bean market in Europe has expanded over the past several years, but unstable seasonal demand in terms of price and volume causes issues. This instability may be partly due to the production volume of French beans in North African countries that have recently increased their exports of French beans.

The price of processed French beans in the European market is stable and the market is expanding, according to French bean processors in Kenya.

<sup>40</sup> Green beans include French beans, red beans, and others in FAOSTAT.



**Figure 4-18: Volume of exported green beans from Kenya (tons) and the ratio of exports to total production (%)**

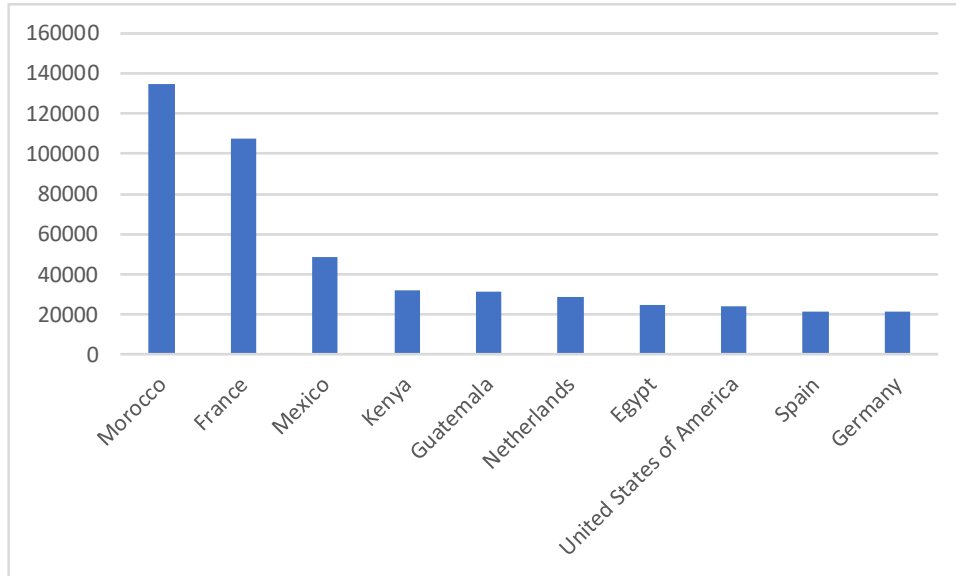
Source: FAOSTAT

(2) Kenyan French beans in the global market

Figure 4-19 shows the amount of green bean exports from Kenya. Morocco exports the most green beans in the world. Kenya has the second-most exports among African countries, and European countries, such as the Netherlands, France, Spain, and Belgium, are also major exporting countries. Several Kenyan French bean exporters mentioned that North African countries, including Morocco and Egypt, are strong competitors to Kenya, and they have substantial French bean exports, as shown in Figure 4-19.

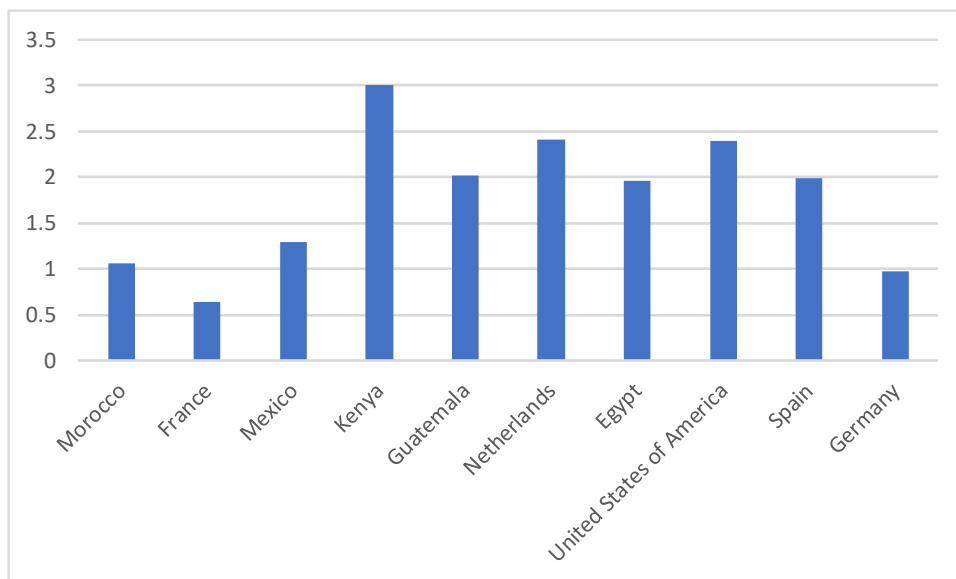
Figure 4-20 compares the unit export prices of the top ten French bean-exporting countries<sup>41</sup>. Kenya's unit price is the highest among the ten countries. The Agriculture and Food Authority of the Ministry of Agriculture, Livestock and Fisheries mentioned that the relatively cold climate in Kenya's highlands is suitable for cultivating fine and extra fine beans, whose unit price is higher than those of other French beans. The unit prices of green beans from Kenya's competitors, such as Morocco and Egypt, are lower than that of Kenya.

<sup>41</sup> The unit price of green beans is not necessarily available for all ten countries listed in Figure 4-19, and, thus, the same countries are not shown in Figure 4-19 and Figure 4-20.



**Figure 4-19: Amount of exported green beans by the top ten countries in 2016 (1,000 USD)**

Source: FAOSTAT

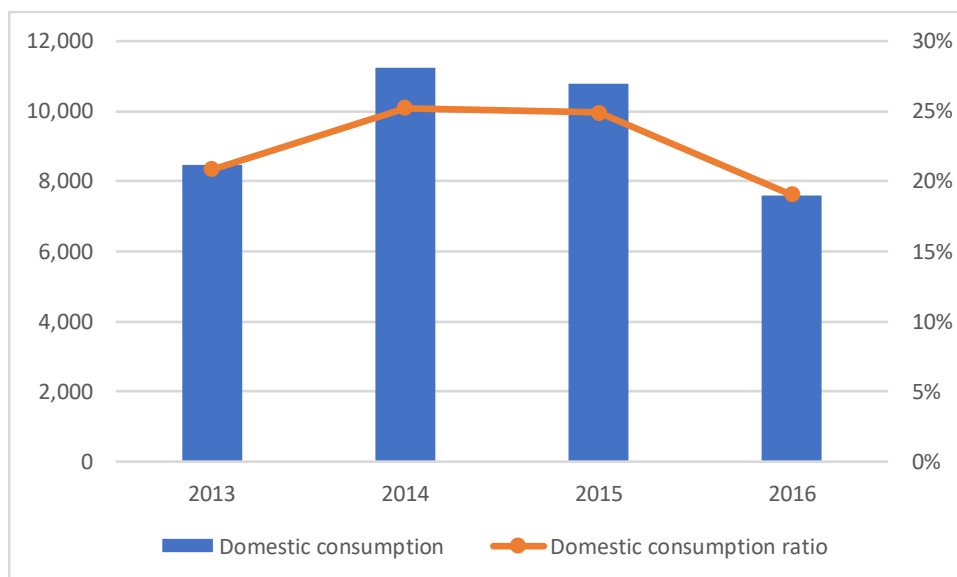


**Figure 4-20: Unit price of exported green beans by the top ten countries in 2016 (1,000 USD/kg)**

Source: FAOSTAT

### (3) Domestic market

Most French beans produced in Kenya are exported, and domestic consumption is not large. Figure 4-21 shows the volume of French beans consumed locally and the ratio of local consumption to total production in Kenya. The figure indicates that local consumption fluctuated between 8,000 and 11,000 tons and between 20% and 25% of total production from 2013 to 2016.



**Figure 4-21: Domestic consumption of green beans in Kenya (tons) and the ratio of domestic consumption to total production (%)**

Source: FAOSTAT

Around 10,000 tons is a very small amount for a locally consumed vegetable. Domestic consumption of cabbage, one of the most commonly eaten vegetables in Kenya, was as high as 690,000 tons in 2017. Table 4-21 summarizes the local retail situation of French beans in Kenya.

**Table 4-21: Retail of French beans in Nairobi**

Category		Price	Buy from	Sell to
Wholesale market (Wakulima market)		60 KES/kg *Price is high from January to March owing to a shortage of supply.	Farmers or middlemen in Kiambu and Muranga Counties	Retailers, restaurants, and Kenyan individuals
Retail open market	Toy market	10 KES/heap (around 100 g)	Wakulima market	Kenyan individuals
	City park market	50–80 KES/kg	Wholesalers in Makuemi county	Kenyan and foreign individuals
Supermarket (Taskys)		89 KES/kg	N/A	Kenyan individuals

Source: The Survey Team



Top: Wakulima market  
Bottom: French beans on sale in Wakulima market



Top: Toy market  
Top right: Diced French beans and carrots in Toy market



Bottom: Supermarket. French beans are on the left side of the lower shelf.

Source: <https://www.facebook.com/pg/Jikomart/posts/>

The small local market for French beans in Kenya is fundamentally attributed to the fact that French beans are produced for export and are not part of a typical Kenyan diet. Moreover, the price of French beans is too high for many Kenyans to consume on a daily basis. The cost of producing French beans is higher than that of producing vegetables for the local market because of importing seeds, obtaining GLOBALG.A.P. certifications, applying pesticides carefully to comply with the MRLs of European countries, and so on. Table 4-22 shows the farm gate prices of major vegetables for export and for the local market. Vegetables for export are produced less than those for the local market, but their prices are four to ten times higher.

**Table 4-22: Production volumes and unit prices of vegetables for export and domestic consumption in Kenya in 2018**

Category	Crop	Volume (tons)	Unit price (KES/kg)
Vegetables for export	Runner beans	1,508	135.6
	Asparagus	4,820	77.8
	French beans	66,765	49.6
Vegetables for domestic consumption	Spinach	169,356	17.1
	Kale	600,766	16.0
	Cabbage	620,523	12.3

Source: Agriculture and Food Authority, Kenya

#### 4.4.7. Policies and role of the government

The current policy for the agricultural sector is the Agricultural Sector Transformation and Growth Strategy (ASTGS) 2018–2030. ASTGS has the following three major anchors:

- Anchor 1: Increase the incomes of small-scale farmers, pastoralists, and fisherfolk.
- Anchor 2: Increase agricultural output and value-add
- Anchor 3: Increase household food resilience

French beans are mainly produced by small-scale farmers who cultivate around 0.5 acres of land for French beans. French beans are value-added products, as they are produced under high cultivation management standards to comply with GLOBALG.A.P. and the MRLs of European countries. Thus, French beans are in harmony with ASTGS, but no specific policy promotes the production and marketing of French beans within ASTGS.

#### 4.4.8. Issues and opportunities

##### (1) Issues

Table 4-23 shows the results of the SWOT analysis of the French bean VC. The weaknesses of the VC are that small-scale farmers who produce French beans have low production capacity, meaning that the production potential of the land and seeds is not fully exploited. Moreover, the local market is underdeveloped even for unexportable irregular products.

Threats facing the VC include the unstable European market, conformity to the MRLs of European countries, and competition with other countries in the global market.

##### (2) Opportunities

The strengths of the French bean VC are a favorable climate for producing quality French beans, an Economic Partnership Agreement with the EU that exempts Kenya from custom duties, and so on. Based on these strengths, French beans have become one of the major export crops to European countries.

The opportunities of the French bean VC include the expanding market for fresh French beans and the steady demand for processed French beans in European countries, a potential large market in Asia, and so on.

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>● Favorable climate conditions for producing extra fine French beans</li> <li>● Tax exemption under the Economic Partnership Agreement with the EU.</li> <li>● Capacitated export and processing companies that organize farmers or vertically integrate the VC.</li> <li>● Government pack house providing facilities for small exporters</li> </ul>	<p><b>Weaknesses</b></p> <p>(The followings are mostly applicable to smallholders)</p> <ul style="list-style-type: none"> <li>● Difficult access to credit for expanding production</li> <li>● Insufficient capacity to form independent farmers' groups</li> <li>● Limited subsidy schemes for procuring fertilizer</li> <li>● Locally developed varieties are not accepted by customers.</li> <li>● Insufficient number of government extension agents</li> <li>● Insufficient supply of water for irrigation during the dry season</li> <li>● Insufficient basic knowledge of cultivation</li> <li>● Limited cold storage (even traditional storage) on production sites</li> <li>● Underdeveloped domestic market</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>● Stable farm gate price of raw materials for processed French beans</li> <li>● The EU's growing fresh and processed French beans market</li> <li>● Potential Asian market</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>● Fluctuating demand for fresh French beans in Europe</li> <li>● Compliance with MRLs</li> <li>● Strong competitors in Morocco, Egypt, and other East African Countries</li> </ul>

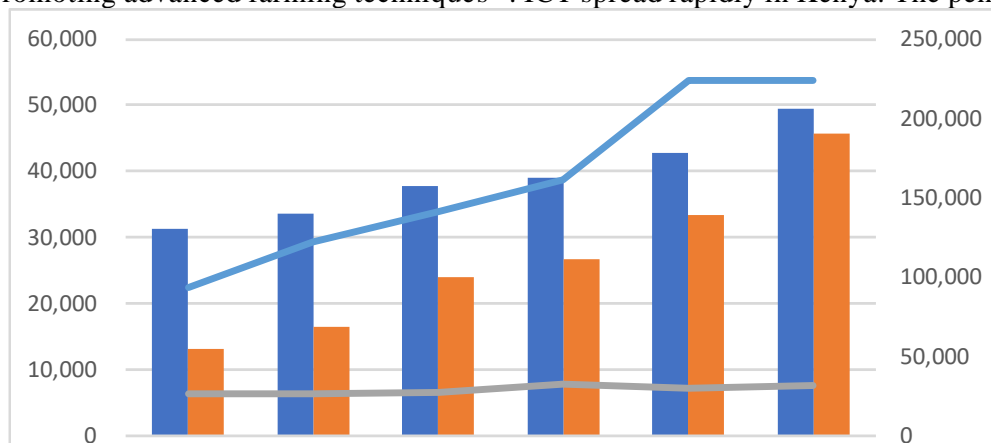
**Table 4-23: Results of the SWOT analysis of the French bean VC in Kenya**

Source: The Survey Team

## 4.5. E-Agri Platform

### 4.5.1. Outline

In Japan, an action plan was created as a result of the Yokohama Declaration 2019 of TICAD7, which was carried out in August 2019. The plan included establishing the basis for e-Agriculture digitization by working on promoting innovation in the e-Agriculture sector and by introducing and promoting advanced farming techniques<sup>42</sup>. ICT spread rapidly in Kenya. The penetration rate



**Figure 4-22: ICT spreading in Kenya**

Source: The Survey Team, based on information provided by the Japan External Trade

Organization (JETRO) Nairobi Office

<sup>42</sup> Source: Yokohama Declaration 2019

of a cellphone was around 100% in Kenya in 2018, as Figure 4-22 shows (Around 50 million of population owns a cellphone. The use of mobile money increased slightly, with 60% or more of the population using it as of 2018. Safaricom holds a 60% share of cellular phone subscribers, and “M-Pesa,” the mobile money service of Safaricom, occupies an 80% share. Safaricom is in a one pole rule state relative to others in the communication industry.

Given this background, a survey was conducted to understand the usage of ICT in the e-Agriculture value chain in Kenya.

#### 4.5.2. E-Agri platform and existing similar platforms

In 2019, the e-Agri platform was discussed by the e-Agriculture Working Group of the Japan Business Council for Africa<sup>43</sup>. By digitizing farmers’ organizations and businesses, the platform identifies issues related to value addition, irrigation, storage, transport, financial insurance through market access, technical improvements, mechanization, and processing. The platform takes step-up measures based on assumptions about farmers’ efforts and quantifies the effect of assistance through public and private cooperation. The platform considers that a farmer participates in a virtual farmers’ organization to receive better service at each stage of the value chain, from cheap purchases or rentals of agricultural machinery, access to farming techniques, and information on diseases and natural disasters to market access as a group member. Market expansion through participation in this platform, a steady supply of farm products, and a decrease in business costs are all expected for private enterprises<sup>44</sup> (see Figure 4-23).

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([https://www.mofa.go.jp/region/africa/ticad/ticad7/pdf/yokohama\\_declaration\\_en.pdf](https://www.mofa.go.jp/region/africa/ticad/ticad7/pdf/yokohama_declaration_en.pdf) accessed on October 16, 2019)

<sup>43</sup> The Japan Business Council for Africa was established as a “multiple-stakeholder framework” by Japanese private companies, the related ministries, government institutions, and international organizations based on the “TICAD7 Public-Private Roundtable Meeting Recommendations by the Japanese Private Sector,” approved by the TICAD Public-Private Roundtable Meeting on March 18, 2019. (source: Website of the Ministry of Economy, Trade, and Industry (<https://www.meti.go.jp/press/2019/06/20190607004/20190607004.html>) accessed on October 16, 2019). The committee participants exchange information and views about business in Africa. The committee is expected to facilitate the penetration of private companies in Africa through discussions, implementation, and reviews of assistance policies by related ministries and governmental organizations.

<sup>44</sup> Source: Concept of the Digital Farmers’ Cooperative (Discussion group of the E-agriculture sector working group of the e-Agribusiness Committee)



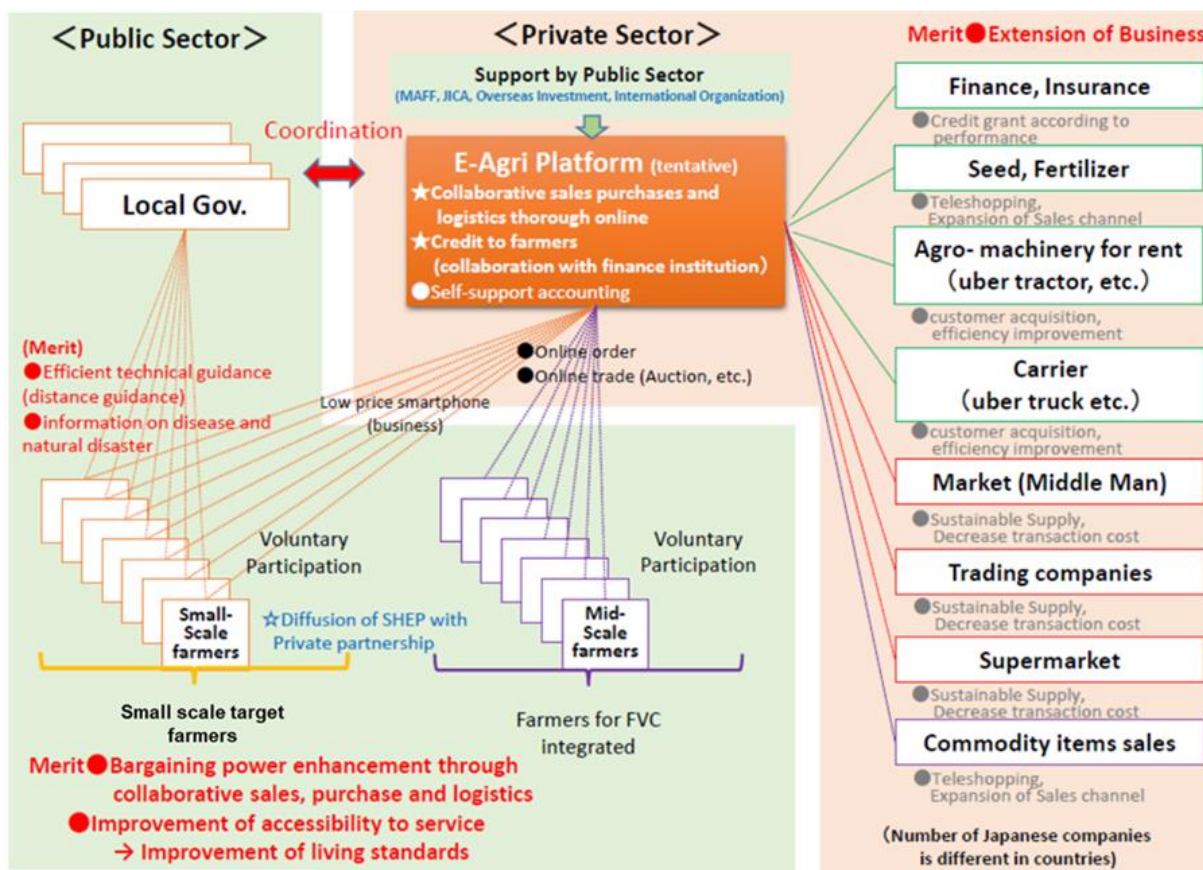


Figure 4-23: Concept of the e-Agri platform

Source: Digital Farmers' Cooperative, presented by the discussion group of the e-Agriculture working group of the e-Agribusiness Committee

This section provides an outline and issues of projects and programs similar to the e-Agri platform created by the Kenyan government, other development partners, and the private sector. In addition, the proposals for the e-Agri platform and two models are described.

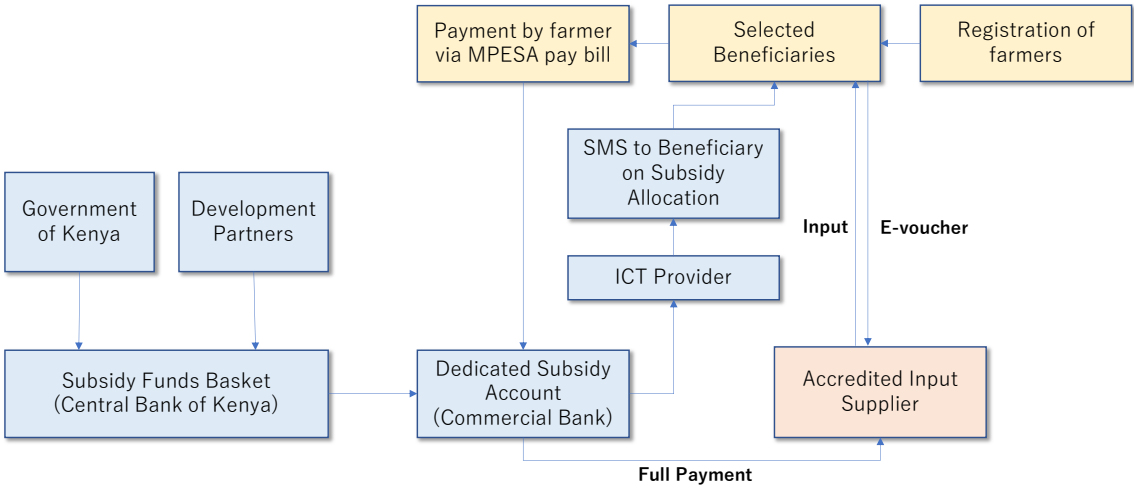
(1) Government of Kenya

This section describes the e-Voucher system, which will be put into operation in 2020, as an example application of digital technology in the agricultural sector.

The Kenyan government started a subsidy system for agricultural inputs (particularly improved seeds and chemical fertilizers) in 2007 under the National Accelerated Agricultural Inputs Access Program. The inputs procured by donors and the Kenyan government were outsourced and sold by the NCPB, a public corporation. However, problems were pointed out. For example, farmers in areas with no nearby NCPB storage facilities had difficulty accessing subsidized inputs, and NCPB staff members committed fraud (such as issuing vouchers to non-

farmers)<sup>45</sup>. Thus, the Kenya e-Subsidy Input Management System (KESIMS) is being developed in collaboration with the FAO to provide smallholder farmers in rural areas with easy access to inputs and to prevent the recurrence of corruption. The full-scale operation of the KESIMS is scheduled to start in 2020, and it is still under consideration. An outline of the anticipated system at this stage is as follows<sup>46</sup>.

Under the KESIMS, the government and donors make deposits with the Central Bank of Kenya to fund the subsidies. These funds are deposited in a state-selected commercial bank subsidy account. Farmers wishing to use the subsidy system can register with Unstructured Supplementary Service Data or the e-Citizen Portal (website) through their mobile phones and, once approved, can apply for the subsidy system. Once a farmer is selected for a subsidy, he or she is notified via SMS. At that time, the farmer is required to deposit a certain amount of the input's price into the account dedicated to subsidies described above through M-Pesa. Once this deposit has been confirmed by the commercial bank, the farmer is issued an e-Voucher, which allows him or her to procure the necessary agricultural inputs from the agro-dealer. Finally, agro-dealers can receive the total value of the inputs supplied to farmers from commercial banks by presenting their e-Vouchers.



**Figure 4-24: Outline of the KESIMS (Draft)**

Source: Prepared by the Survey Team based on explanations from officials in the Ministry of Agriculture

The Kenyan government is considering a phased reduction of subsidies to farmers for the purpose of an exit strategy to ensure sustainability. Specifically, it is considering providing 60% of input prices in the first year, 40% in the second year, 20% in the third year, and no subsidies after the fourth year.

<sup>45</sup> Daily Nation (<https://www.nation.co.ke/business/Farmers-to-get-e-vouchers-for-cheap-fertiliser/996-4892878-imw3xn/index.html>)

<sup>46</sup> Based on explanations from officials in the Ministry of Agriculture

(2) Similar projects and programs by development partners and the private sector

The following are projects and programs by development partners and the private sector that are similar to the e-Agri platform.

1) World Food Programme (WFP)

The FtMA is a digital platform hosted by the WFP that covers the entire FVC since 2016 through a collaboration of public and private entities. Of the programs and projects run by development partners, the FtMA is assumed to most closely resemble the Japanese e-Agri Platform. The board members of the FtMA are the Alliance for Green Revolution in Africa<sup>47</sup> (AGRA), Bayer (chemical pesticides), Rabobank (finance), Syngenta (seeds), and Yara (fertilizers). The FtMA also collaborates with a variety of organizations, such as Mercy Corps (app development), the Norwegian Agency for Development Cooperation (NORAD), Transform<sup>48</sup> (a joint organization of Unilever and the Department for International Development (DFID)), and the US Agency for International Development (USAID).

a) Target countries and farmers of FtMA

The FtMA targets Kenya, Tanzania, and Rwanda. In Kenya, the FtMA targets smallholder farmers who can sell a surplus of crops under five acres, but farmers with one to two acres on average participate in the program. The WFP conducts trainings for leader farmers on how to decrease aflatoxins to handle pre-processed yields. At the beginning of the FtMA, Zambia was included as a target country. However, its difficult economic situation, characterized by inflation, has led to the project's suspension. In Rwanda, 80 farmers' groups have been organized, and 70,000 farmers have joined. Some of them have contracted with prominent buyers, such as Profood Africa<sup>49</sup>. The WFP plans to expand the FtMA to Uganda, Ethiopia, and other countries in West Africa starting in 2020.

b) Target crops of the FtMA

In Kenya, the FtMA targets soybeans, sorghum, and potatoes. It targets sorghum and soybeans in Tanzania and maize and beans in Rwanda. The FtMA sets target crops based on the market and environmental conditions. The WFP focuses on the crops that contribute to food security and, thus, does not include avocados, which are planted for export. The WFP selected soybeans

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<sup>47</sup> AGRA was founded in 2006 in response to a call from the former UN Secretary-General, Kofi Annan, to facilitate e-Agriculture in eleven countries in Africa, including Kenya. AGRA conducts agriculture projects and programs with support from a variety of institutions, such as UN organizations, USAID, the Bill Gates Foundation, and the Rockefeller Foundation. (<https://agra.org/>, accessed in October 2019).

<sup>48</sup> <https://www.transform.global/Intro.aspx>

<sup>49</sup> Profood Africa is a processing, wholesale, and retail trading company that has eleven branches around the world, including in South Africa.

because (i) the supply of soybeans is much lower than the demand, as 270 tons/year of soybean demand is met by imports; (ii) soybeans provide substantial benefits and nutrition; (iii) soybeans improve nutrition in the soil, lowering investment costs for farmers; and (iv) soybeans are resilient to drought, and plant quarantine is not strict in Kenya.

c) Technical extension of the target crops

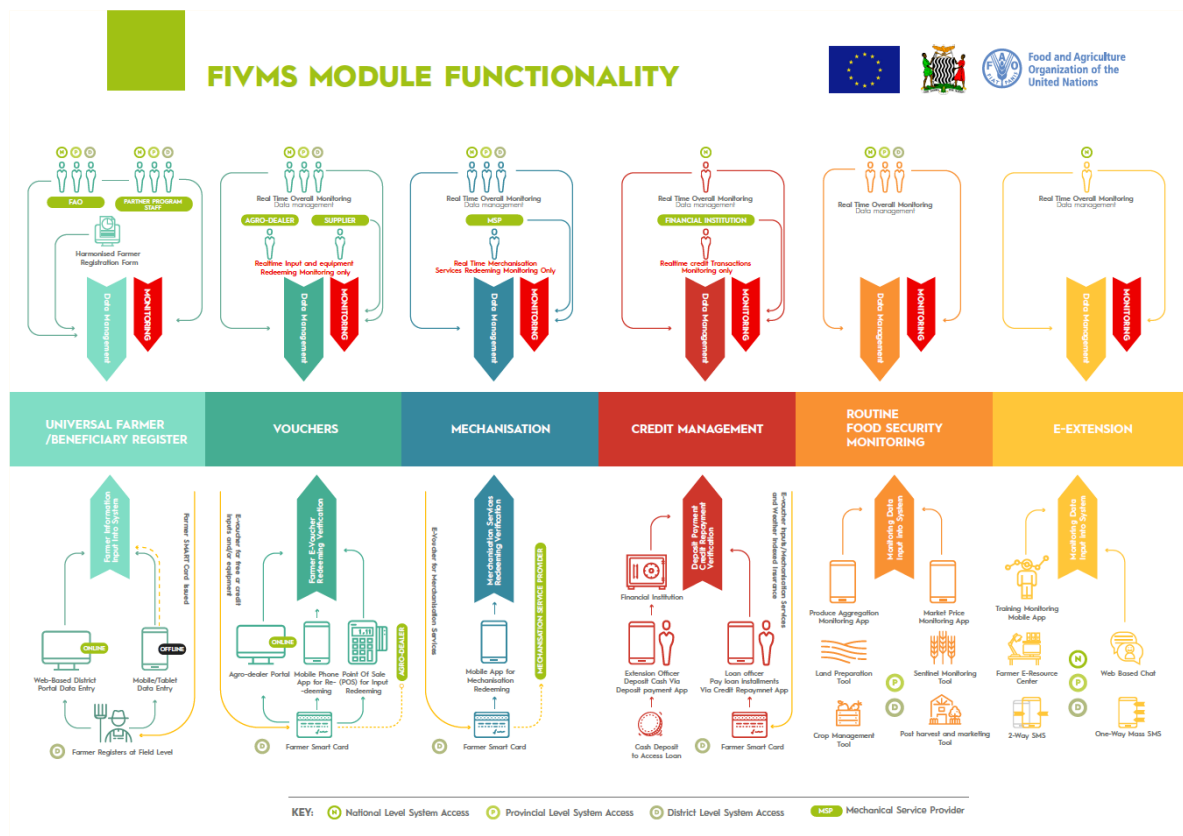
Private buyers provide the target farmers with training under the FtMA. Agro-business advisors (i.e., farmers' group leaders) control the quality of the crops produced by the farmers. In August 2019, 259 agro-business advisors participated in a training. The WFP believes that the extension system of the Kenyan government has not functioned well since decentralization. Conversely, the extension staffs of private companies are gaining popularity in Kenya. When the extension staff of a county government retires, the government has difficulty allocating sufficient budget to employ new staff. Private buyers receive opportunities to introduce their new products to farmers through extension training. Such trainings lead to sales promotions for buyers as well as extensions. The WFP recognizes that its role is to select appropriate partner companies and establish proper partnerships with farmers. The WFP urges the withdrawal of buyers who sell products to farmers at higher prices than in the market.

d) Sustainable formation and management of farmers' groups

The WFP links farmers and the market by establishing the Rural Entrepreneurs Center as a center for FtMA activities. The program conducts trainings for the center's staff on the management of farmers' organizations and collective farming. The WFP considers that the management of the center will be sustainable after the WFP's withdrawal by charging a commission to buyers for introducing them to appropriate farmers when they request to buy crops produced by the farmers. Kenya has 250 centers as of September 2019, and 100 to 300 farmers belong to each center. The WFP will double the number of centers soon.

2) FAO

The FAO is planning the Digital Value Chain Support Program as a fast track program using the FAO budget as of September 2019. The program is a comprehensive platform that includes farmer registrations, e-Vouchers, control of subsidies, and market mapping, as indicated in Figure 4-25. The FAO expects that the JICA will join the program as a partner.



**Figure 4-25: Concept of the digital value chain support program**

Source: FAO

### 3) AfDB

The AfDB and AGRA have discussed the digital platform. The AfDB expects the Japanese government to jointly promote the platform with AfDB-AGRA by, for example, providing 74,180,000 USD to the Fund for African Private Sector Assistance<sup>50</sup>.

### 4) EU

The EU, which financially supports the International Fund for Agricultural Development (IFAD), established a digital platform in the e-Agriculture sector with Kenya's Ministry of Agriculture. The project period is from 2015 to 2023, and the project targets maize, sorghum, millet, and beans.

Target farmers are divided into two categories, as Table 4-24 indicates. The EU's digital platform covers agricultural inputs (seeds and fertilizers), agriculture machinery, and the transportation system. The inclusion of e-agriculture insurance in the platform is under discussion in the EU as of September 2019.

<sup>50</sup> <https://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/fund-for-african-private-sector-assistance>

**Table 4-24: Agriculture ICT platform program of the EU**

Category 1	Category 2
< Common points >	
Farmers open accounts with equity banks and/or agriculture cooperative banks and purchase an e-Agriculture input kit (debit card) by owing 10% of the total charge. In this platform, the burden on farmers gradually increases to 25% in the second year and 50% in the third year. Farmers are independent and become able to purchase input materials at the end of the period.	
<ul style="list-style-type: none"> <li>• small-scale farmers with fewer than five acres</li> <li>• self-sufficient</li> <li>• mostly individual farmers</li> </ul>	<ul style="list-style-type: none"> <li>• farmers with five to twenty acres</li> <li>• production at the commercial level</li> <li>• mostly farmers that form agricultural cooperatives</li> <li>• network shares the aggregation center, quality control, and the collective use of the warehouse</li> <li>• farmers receive information about conservation agriculture and the weather</li> </ul>

Source: Survey Team, based on an interview with the EU

The EU pointed out that the issues with this program are: 1) the number of beneficiaries is gradually decreasing, 2) drought, floods, and diseases affect crop production, 3) GLOBALG.A.P. standards are too strict for farmers, 4) the prices of agricultural inputs are high, 5) there is a lack of aggregation centers, and 6) climate change. The EU recognizes that the issues with e-Agriculture are not fully solved even though they established a digital platform.

In addition to the platform mentioned above, the EU approved a new program for women and youth in Kenya in September 2019 that includes the establishment of agriculture incubation centers. In this project, women and youth groups undertake small-scale agriculture. The center functions as a platform with ICT, and target women and youth receive information about service providers, such as agricultural input dealers. The EU will establish these centers in eight counties by 2020.

#### 5) The World Bank (WB)

In 2019, the WB began financing programs and projects for Digital Green, which promotes the extension of digital agriculture to small-scale farmers in Kenya, Ethiopia, Rwanda, Nigeria, South Sudan, and India. The WB will also provide financial support to Kuza Biashara<sup>51</sup>, which provides small-scale farmers with microlearning using such devices as smartphones and micro mentoring.

- a) Digital Green plans to implement a project to promote the management of fruit flies on mangos, targeting 10,000 farmers in Makeni County. This project will utilize a “video extension approach” with the participation of residents (2019 to 2021). This approach consists of five steps, namely, 1) selecting participants from the community, 2)

<sup>51</sup> <http://www.kuzabiashara.co.ke/>

conducting video-making training, 3) making videos, 4) creating extensions using the videos, and 5) feedback. Of these steps, 4) extensions and 5) feedback are characterized by the utilization of a mobile application. In Ethiopia, 400,000 farmers already participate in the project, and 50% of them succeeded in adopting G.A.P. In the Kenyan version of the project, Digital Green will cooperate with the Rockefeller Foundation, the University of Nairobi, the Kenya Plant Health Inspectorate Service (KEPHIS), and KALRO.

b) Kuza Biashara established the e-Agri Preneur Platform, shown in Figure 4-26, which has been applied by more than 500,000 farmers in seven provinces in Kenya. The platform will be expanded to Kenya, Uganda, and Mozambique starting in 2019. This platform is similar to the e-Agri platform in its promotion of the extension of agriculture techniques to smallholder farmers, provision of high-quality agricultural inputs and credit, and improvement of market access. In addition, the platform will support entrepreneurs in



**Figure 4-26: Concept of E-Agri Preneur**

Source: Materials offered by the WB

incubation. With this platform, smartphones are used not only to improve access but also to mentor farmers. Kuza Biashara has extensive experience targeting 16 kinds of horticulture crops (vegetables and fruit), 15 types of grains (wheat and maize), four kinds of plantation crops (coffee and coconuts), and five kinds of cash crops (sugarcane and cigarettes) in India. The target crops in Kenya are under consideration. Indian foundations and companies, such as TATA Trusts, the Industrial Development Bank of India, the WB, and Robobank will cooperate on this platform in the future.

6) Kenya Market Trust (DFID)

Kenya Market Trust (KMT) was founded in 2012. The Kenya Grants, a former institution of KMT, implemented the One Village One Product project with JICA. As of September 2019, KMT helps smallholder farmers with fewer than two acres nationwide in the market. The projects and programs related to e-Agriculture with financial support from the DFID are as follows.

a) KMT provides the types and quantities of fertilizers necessary for the production of crops, off-takers of seeds, and production-related information, including G.A.P.,

through a smartphone.

- b) KMT promotes the digital business of certified agricultural inputs (e.g., pesticides and fertilizers) through application development.
- c) KMT encourages the purchase of certified seeds through a collaboration with the KEPHIS. By attaching an inspection code to a package or can of seeds, KMT can confirm a buyer farmer. When the farmer who bought this can inputs the code into SMS, he or she can immediately see that the seeds are certified. Through this system, farmers can purchase the appropriate seeds. For seed companies, this system helps to control forged certified seeds.
- d) Village Service Providers give young farmers information on G.A.P. by utilizing their smartphones. As of September 2019, there were 176 providers; each of them is in charge of around 100 farmers. (KMT collaborates with Toyota Tsusho Corporation.)



**A can of seeds with an inspection code**

#### 7) Safaricom

Safaricom, a mobile telecommunications firm, has been providing DigiFarm, which includes the sale of agricultural products and a matching service, to farmers in Kenya since 2017. As of September 2019, DigiFarm has about 1,100,000 users, and about 30% of them use the services. DigiFarm targets small farmers with fewer than five acres of land.

##### a) Service contents

The DigiFarm's services include the following:

- Access to information

Provides information about cultivation skills and techniques through mobile phones.

- Access to (quality) inputs

Users can order quality inputs selected by Safaricom through mobile phones. The products are delivered from their depots (Kenya has 300 depots).

- Access to credit

Safaricom provides loans to users. They plan to work with financial institutions as partners for this service.

- Access to markets

Twenty agriculture-related firms (i.e., wholesalers, exporters, and processors) can send agricultural products to farmers through DigiFarm. The major products include sorghum, maize, and various vegetables and meats. The ordering process is as follows. First, buyers set orders by



inputting quantities and prices to DigiFarm, and the system then identifies farmers that can comply with the orders until the necessary quantity is met. The payment process is as follows. Buyers first make deposits in DigiFarm accounts. When they purchase products through DigiFarm, the purchased amounts are withdrawn from their accounts, and DigiFarm pays the amounts directly to the farmers.

Assuring the quality of registered farmers' products is a major challenge for DigiFarm, and village advisors play a role in this process.

#### b) Village Advisors

Safaricom hires Village Advisors who monitor and provide technical support to the registered farmers. Each Village Advisor looks after 100-150 farmers and conducts such activities as monitoring farms, conducting soil tests, and visiting the farmers when there are quality issues.

#### c) Business model

All of DigiFarm's services to registered farmers are free of charge. Safaricom shares its profits with registered buyers and the providers of inputs for the sales of agricultural products and inputs. They also impose service charges for loans.

As of September 2019, 75% of DigiFarm's total revenue comes from trades of agricultural products. They have not recovered their initial investment since starting the business.

#### d) Future plans

Safaricom plans to add the following services to DigiFarm:

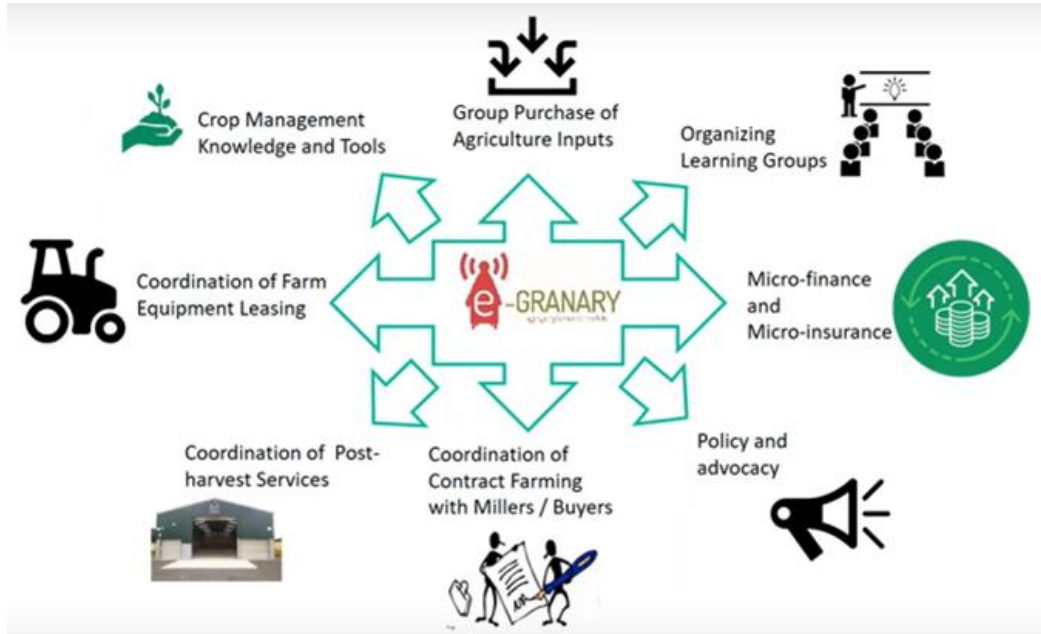
- Setting up a call center to enhance information services.
- Adding traceability functions for the sales of inputs.
- Increasing the number of depots for inputs to 1,000.
- Adding Commodity Exchange services among cooperating members.
- Adding deposit services.

#### 8) Eastern Africa Farmers' Federation

The EAFF is a federation of farmers' organizations in ten countries<sup>52</sup> in East Africa, established in 2001. The EAFF operates an online platform called e-Granary, which is funded by Vision Fund Kenya founded by World Vision, as described by Figure 4-27. As of September 2019, approximately 300,000 farmers under EAFF are registered to the service, but only maize and soybeans are handled. EAFF plans to increase the target crops in the future.

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<sup>52</sup> Burundi, Djibouti, Democratic Republic of the Congo, Eritrea, Ethiopia, Kenya, Rwanda, South Sudan, Tanzania, and Uganda



**Figure 4-27: E-Granary's services**

Source: E-Granary website

a) Services

Farmers can register with the e-Granary system by accessing “\*384\*01#” via mobile phone and can then make orders to purchase agricultural inputs. E-Granary's main services are as follows:

- Coordination of contract farming
- Sales of agricultural inputs
- Loans
- Insurance (e.g., crop insurance, life insurance)
- Advice on production techniques

The role of e-Granary is similar to that of wholesalers. It finds new buyers through its own sales efforts and coordinates contract farming with registered farmers who can produce the items at the quantities demanded by customers. Contract farming is essentially carried out with farmers' unions. The average number of farmer households per union is 50 units.

b) Soybean contract farming

The minimum purchase price is set to approximately 40 KES/kg, and payment is made within three days after the product is delivered under soybean contract farming. Payments are made via (1) bank transfer if the amount exceeds 75,000 KES or (2) M-Pesa if it does not exceed 75,000 KES. E-Granary has a system for distributing profits to farmers if the price to the customer is high. E-Granary only obtains a 10% profit in the case of soybeans. For example, if the purchase price of soybeans from the farmer is 40 KES/kg and the selling price to the customer is 60 KES/kg, E-Granary receives only 6 KES/kg (10% of the sales amount), and the difference of 14 KES/kg is distributed to farmers as a bonus.

E-Granary also sells agricultural inputs to contract farmers. Fertilizers are supplied by ETG. Seeds and biofixes are supplied by Seedco and are delivered to farmers by ETG. The transportation costs of these agricultural inputs are covered by e-Granary at a certain margin when selling to farmers. Two types of insurance (i.e., crop insurance and life insurance), which are compulsory for entry, are provided by insurance companies. When farmers pay 20% of the total amounts of materials and equipment ordered, the remainder is treated as credit, and a substantial amount of this credit is deducted after the product is harvested and sold.

Figure 4-28 shows the soybean production costs of a farmer (two acres) registered with e-Granary. Crop insurance is applied, and a certain amount is paid when the soybean yield is less than 200 kg/acre.

DAP: 13,040 KES (3,260 × 4 bags)
CAN: 8,240 KES (2,060 × 4 bags)
March (Agro-chemical): 910 KES (200 ml)
Seeds: 3,600 KES/20 kg
Crop insurance: 3,600 KES
Life insurance: 376 KES
Handling charge: 1,880 KES
Total cost: 31,346 KES /2acre
(Advanced payment (20% of total cost) is necessary)

**Figure 4-28: Production Cost of Soybeans** Source: The Survey Team based on an interview with EAAF

c) Storage

The crops produced by farmers are collected and stored in storage facilities. As of September 2020, this operation involves borrowing part of the storage that has already been built. The main functions of the storage facility are safe management, drying and humidity control, collection, and storage. E-Granary's main storage facilities are in Tahelo, Bunyala, Muea, and Busia (planned).

9) OnceSync Limited

OnceSync Limited is a startup founded in 2016 that provides a trading mobile app between farmers and buyers that uses blockchain, called Shamba Records. Shamba Records began offering services, as shown in Figure 4-29, in 2018. As of September 2019, four agricultural

cooperatives (6,000 farmers in total) use the service to trade tea, coffee, and dairy products with exporters and domestic supermarkets. The user pays a subscription fee and a maintenance fee to use the service. OnceSync charges 1–5% of the transaction amount through Shamba Records as a handling fee. The company's total transaction amount is 5 million USD. It also provides loans (10% interest rate) to small-scale farmers.



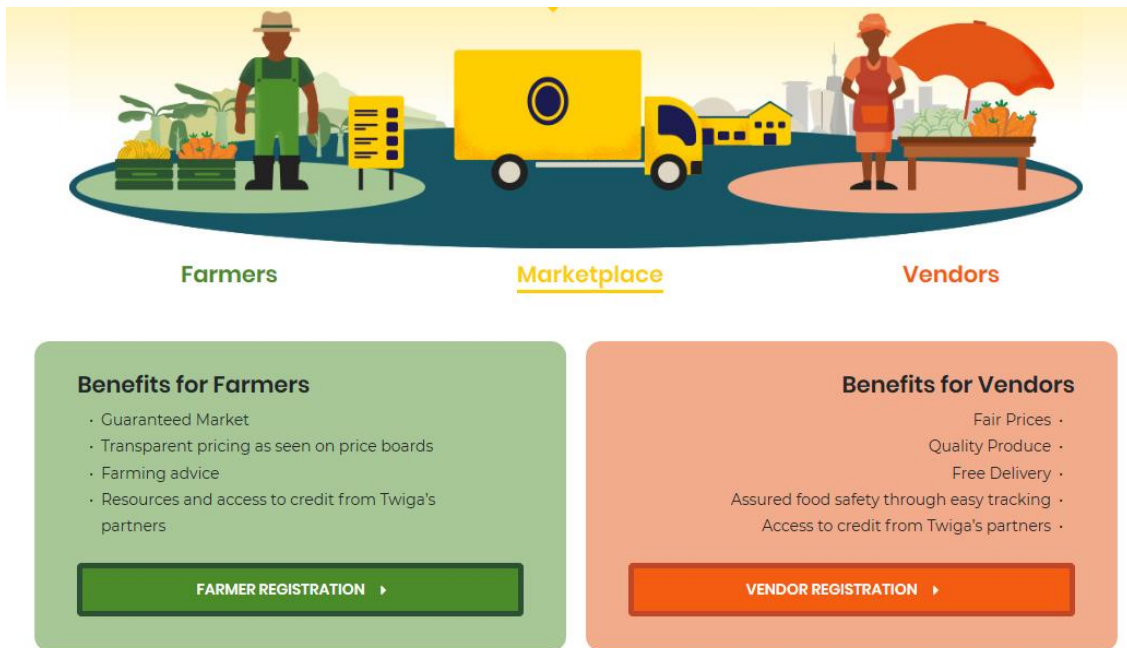
**Figure 4-29: How Shamba Records works**

Source: OnceSync

Its main challenges are (1) a lack of funds and (2) a lack of human resources to expand its business. The company is located in the Business Innovation and Incubation office at Kenyatta University and operates with three people, including the CEO, but this size is insufficient to respond to telephone inquiries and sales to promote the service. The company plans to expand its business area around Nairobi and seeks to collaborate with companies that can provide equipment, such as point of sale equipment, equipment to weigh crops, computers, printers, and sensors.

10) Twiga Foods Limited

Twiga Foods Limited is a vegetable wholesaler founded in 2014 that provides a platform to connect farmers and vendors, as shown in Figure 4-30. As of September 2019, the company serves 13,000 farmers and 6,000 vendors. The company has logistics functions, such as collection centers (with refrigeration facilities), distribution centers, and delivery trucks. Vendors can order products using dedicated apps for mobile devices or SMS on mobile phones and can receive products quickly through next-day delivery. In addition, the products handled are cheaper, are sold at a flat rate, and are better quality than those sold in the traditional market. The company has a win-win business model that guarantees a fair price to farmers and quality products and proper wholesale prices to vendors.



**Figure 4-30: Merit for farmers and vendors**

Source: Twiga Foods website

The company is steadily expanding its business. It offered five products (bananas, pineapples, tomatoes, onions, and papayas) in 2016, but this number increased to 13 products (avocados, cabbage, carrots, oranges, mangoes, passion fruit, peppers, and potatoes were added) in 2019. The company is also working on a microfinance business utilizing blockchain technology in partnership with IBM<sup>53</sup>.

#### 4.5.3. Interests of the Kenyan government

##### (1) Agricultural Information Resource Centre (AIRC)

The AIRC, a public relations agency of the Ministry of Agriculture, provides information to mass media, develops extension materials, and so on. The AIRC has a similar vision to the e-Agri platform and organized a workshop on e-Agriculture with financial assistance from the FAO in 2018. The AIRC has continued to discuss e-Agriculture with the WB, the FAO, Safaricom, Google, Microsoft, and KALRO, which are all interested in the concept. The AIRC mentioned that the permanent secretary of the Ministry of Agriculture, who supervises the AIRC, is not willing to coordinate or manage their actions in relation to e-Agriculture.

The AIRC believes that the public sector should manage the e-Agri platform and that the AIRC is a suitable organization within the Ministry of Agriculture based on its function and ability. The AIRC believes that farmers should use the e-Agri platform for free if it is managed by the

<sup>53</sup> Based on JETRO's 100 African Startups (2019)

public sector. However, companies that use the platform should be charged, and transaction information can be sold to manage the cost of operating the platform. The AIRC mentioned the necessity of assistance from development partners (DPs) with the initial operation costs, PCs and other information technology devices, and technical knowledge for the establishment of the e-Agri platform.

## (2) ICT Authority (ICTA)

The ICTA is one of the parastatal organizations of the Ministry of ICT, and its mandate is to promote e-Commerce. The ICTA constructs ICT infrastructure, such as optical fiber cables, and develops software and applications for computers, but it does not administrate the institution and regulation of ICT.

The ICTA has a strong interest in the concept of an e-Agri platform as a part of the promotion of e-commerce, and it is willing to establish it with the assistance of DPs. The ICTA believes that the e-Agri platform should be operated by the private sector because it is a profit-making body and because private operation is better for its sustainability. Thus, the ICTA suggested selling the e-Agri platform to a company after it takes off.

### 4.5.4. Lessons learned

#### (1) Related organizations' views on E-Agri

The following are the views and comments of the WFP, EU, IFAD, and AfDB regarding the effective and efficient establishment and management of the e-Agri platform.

- 1) WFP: The concept of the e-Agri platform is similar to that of the FtMA. The duplication of similar models in one country should be neither evaded nor expected. However, collaboration with Japanese companies would be very meaningful to the FtMA for expanding its business. At this point, the WFP welcomes JICA's cooperation with the FtMA's roll-out plan.
- 2) EU: Safaricom's DigiFarm is similar to the e-Agri platform. A variety of systems exist, such as the public e-Voucher system and DigiFarm, created by the private sector. If JICA establishes an e-Agri platform under these circumstances, the relevant discussions include the position of the e-Agri platform and an analysis of the cost-effectiveness of helping to strengthen the existing platforms versus establishing a new platform. The number of expected users should also be considered. Because e-Agriculture is high-risk and the e-Agri platform is a high-risk business as well, sufficient preparation is indispensable.
- 3) IFAD: The digital sector, such as the extensive use of M-Pesa, is vital in Kenya. Thus, the concept of the e-Agri platform indicated by the Survey Team is highly applicable.

Other development partners have already cooperated with KALRO, AGRA, and the Global Community (an NGO). In particular, AGRA is developing a similar platform to the e-Agri platform in robust collaboration with the FAO and the WFP. Thus, JICA is advised to avoid duplicating programs by exchanging information with these organizations. At the same time, it is necessary for JICA to collaborate with development partners in developing the e-Agri platform.

- 4) AfDB: The E-Agri platform can collaborate with the Small-scale Irrigation and Value Addition Project (SIVAP, 2016 to 2021) that AfDB is financing.

## (2) Types and contents of platforms

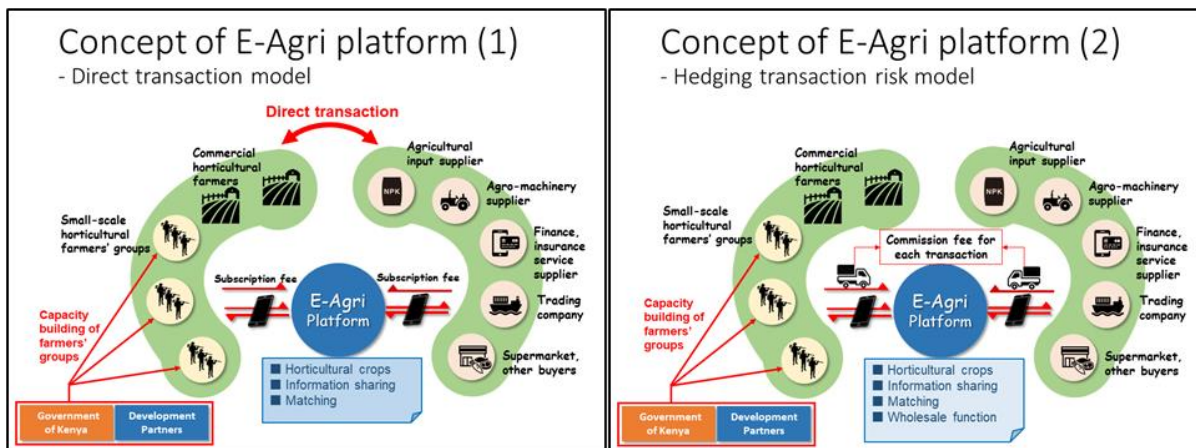
The existing platforms follow various patterns, such as incorporating e-Agriculture into the whole VC (FtMA) and incorporating e-Agriculture into parts of the VC (KMT). Other donors focus on small-scale farmers, and, among crops, they tend to focus on grains for preservation. When JICA establishes a platform, it is crucial that the target area, farmers, and crops do not overlap (e-Agriculture may cover horticultural crops covered by the FtMA, for example). The concept of the E-Agri platform may also be complementary to the existing platforms (e.g., the E-Agri platform may target small-scale farmers in the platform program of the FAO).

### 4.5.5. E-Agri platform model

Considering these lessons learned, the Survey Team developed two types of platform model, as shown in Figure 4-31. These models show the E-Agri platform, which digitizes business between producers and markets, such as agricultural inputs and machinery suppliers, agriculture finance and insurance service providers, traders, and supermarkets. Aggregation and transportation companies combine these actors<sup>54</sup>. The main role of the platform in the model is providing information and matching to both parties. Unlike the similar platforms developed by other donors, the E-Agri platform targets horticultural crops. The main role of donors, including the Kenyan government and JICA, is improving the administrative management capacity of agricultural cooperatives and farmers' groups. In addition, the selection of collaborative private companies and the monitoring of businesses are important roles. In this model, agriculture cooperatives are expected to form farmers' groups.

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<sup>54</sup> Twiga Foods offers a similar service.



**Figure 4-31: Concept of the E-Agri platform**

Source: The Survey Team

In the direct transaction model, the platform operator obtains a budget from enrollment fees and annual subscription fees (fees for information sharing and the matching service) from both sides of transactions. The quality and quantity of agricultural inputs purchased by service providers, the quality of financial services, and the deadlines for traded products are simply the responsibility of the actors involved in the direct transaction model. On the contrary, in the hedging transaction risk model, the platform operator plays the role of commission agent. After matching, the platform keeps the products until it sells to a buyer. An initial fund is necessary for the platform, and cumbersome steps are required to start a business. However, as the business expands, the platform can make a large profit. A platform operator takes responsibility for the quantity and quality, hedging the risk to producers and service providers.

The participants in the workshop provided the following perspectives and described their expectations of the e-Agriculture models.

- These two models can both exist. The direct business model can be applied to agricultural cooperatives, and the direct business model with risk hedging is more applicable for individual farmers.
- Both models enable the buyers to understand the kinds, harvest times, places, and quantities of products. At the same time, producers can determine crop demand (i.e., kinds, times, places, and quantities). These stakeholders expect the platform to be a tool with which both sides can make plans to produce and sell. For distributors and transport companies, the establishment of the platform is meaningful because the platform can visualize the kinds and times of demand. When these movements are completed, the distributor, the mover of input materials is visualized, which makes it easy to do business because the type and timing of demand is revealed. Thus, the platform construction is



important.

- A lack of uniformity in the quality and quantity of agricultural crops and an unstable supply are the most serious problems faced by buyers when they purchase from small-scale farmers. The empowerment of farmers' organizations is important to mitigate these problems.
- Many platforms exist in Kenya. However, in some cases, the circulating materials (such as manure) are limited to those supplied by the makers and distributors participating in the platform. This tendency narrows the choice of input materials on the farmers' side and can be a disadvantage to farmers in some cases. These problems can be evaded by including many input dealers and service providers when establishing the e-Agri platform.

In addition, the stakeholders from the Smallholder Horticulture Empowerment Promotion (SHEP) project pointed out that SMS rather than smartphones should be utilized for telecommunications to help small-scale farmers with 0.5 acres use the platform. The establishment of trust between farmers and buyers, increases in the sales amounts of crops by forming farmers' groups, and developing the capacities of these groups are also necessary. If the Japanese e-Agri platform is established, it is important to collect further information from important stakeholders (e.g., small-scale farmers who participate in similar platforms by other development groups; target farmers' groups of the SHEP project; organizations like AGRA, which conducts similar projects; and financial and insurance institutions) and information on settlement functions. Based on the collected information, discussions should seek countermeasures to tackle a variety of the issues mentioned previously.

#### **4.6. Large-Scale Agricultural Investment in Kenya**

This section provides an outline of the EPZs promoted by the Kenyan government and an example of the companies that have been doing business in Kenya. First, EPZs are special zones that were created in 1999 based on the "Export Development Program" (EDP) and were established as a result of the implementation of the "Export Processing Zone Act (CAP 517)." The regulatory authority is the Export Processing Zone Authority (EPZA). The following incentives have been established to attract export-oriented domestic and foreign companies, and the Kenyan government has promoted the introduction of foreign capital into EPZs to promote export-oriented industrialization. One of the characteristics of EPZs in Kenya is that companies can register with EPZs and receive incentives without changing their locations if they meet EPZA requirements<sup>55</sup>. This system is considered to be effective in developing countries, where

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<sup>55</sup> EPZs or similar zones in the other four countries covered by this FVC survey (i.e., Nigeria, Tanzania,

infrastructure, such as roads, internet, electricity, and railways, is insufficient and factories have to be built in the vicinity of raw material production sites.

#### **Box 4-1: Tax Incentives to Investors**

##### **Tax Incentives for EPZ companies**<sup>56</sup>

- ① The corporate tax is lifted for the first ten years and has a flat rate of 25% for the next ten years. Usually, 30% of Kenyan companies and 37.5% of other companies are subject to taxation in Kenya.
- ② Exempt from ten years of withholding tax.
- ③ 100% investment allowance for the initial investment (applies to buildings and machinery for twenty years).
- ④ Exempt from stamp tax.
- ⑤ Imported machinery, raw materials, and intermediate materials are exempt from customs duties and value-added tax (VAT). However, vehicles used outside the EPZ are subject to taxation.

**[Applicable requirement]** Companies in the EPZ shall export 80% of their products outside the East African Community.

##### **Other Major Incentives**<sup>57</sup>

- ① Goods are exempt from VAT.
- ② When goods are developed by importing materials for the purpose of re-export and domestic sale as duty-free goods, the import tax on the materials is exempted.
- ③ For private investments above \$5 million, the import tax credit for capital goods imports can be offset against income tax with government approval.
- ④ VAT and customs duties on machinery and equipment in the agricultural sector are exempted.
- ⑤ Investments in Nairobi, Kisumu, and Mombasa can receive a 100% investment allowance. Investments in other regions receive a 150% investment allowance (carryover of the investment allowance is allowed).

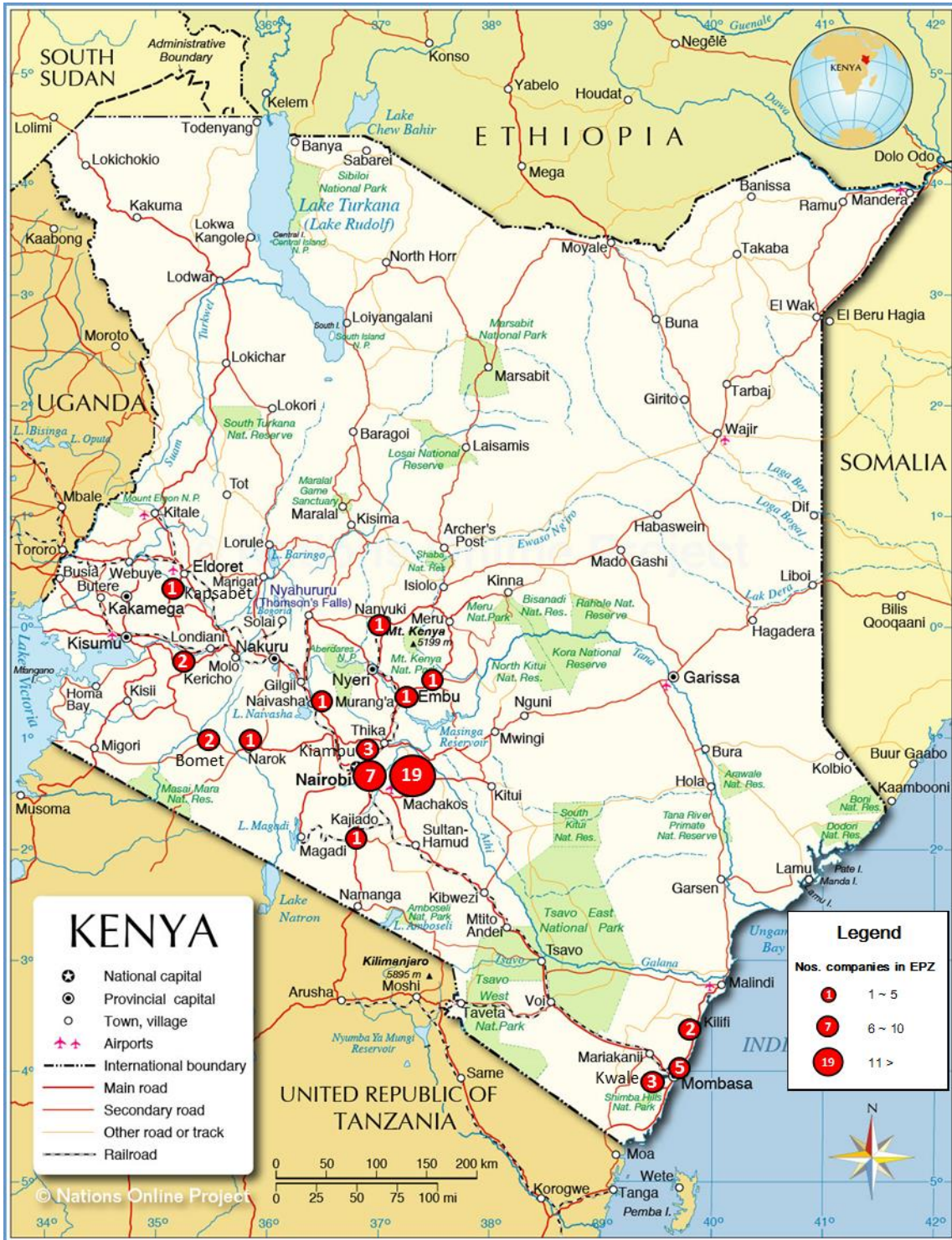
The agricultural processing sector includes 50 EPZs at present. Machacos has the largest number of EPZ areas with 19, followed by Nairobi and Mombasa, all of which are located along a Standard Gauge Railway (see Figure 4-32). Nuts account for the largest share of the products handled (13 EPZs), followed by tea (9), vegetables (8), fruits (8), medicinal plants (4), flowers (4), and oilseeds (3). Other products include herbs, liquors, spices, beans, veneer and charcoal, coffee, and fortified foods. According to data from the KBS as of 2017, the total number of employed persons in EPZs was approximately 55,339, the total export value was KES 60,377 million, domestic sales were KES 6,312 million, and the cumulative investment was KES 92,289 million.

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Madagascar, and Zambia) are a means of attracting companies to designated special zones, and, thus, companies are required to locate within the designated area. In Kenya, a company does not need to change its location if it meets the EPZA requirements, which was not the case in the other four countries.

<sup>56</sup> Hearing from EPZA and JETRO [https://www.jetro.go.jp/world/africa/ke/invest\\_03.html](https://www.jetro.go.jp/world/africa/ke/invest_03.html)

<sup>57</sup> Kenya Revenue Authority



**Figure 4-32: Distribution of EPZs in Kenya’s agricultural processing sector**

Source: The Survey Team analysis based on the Nations Online Project and EPZA

#### 4.7. Assistance by the DPs in the Value Chains of Soybeans, Avocados, and French Beans

This section discusses the assistance programs and projects for the VCs of soybeans, avocados, and French beans that are implemented by the DPs

(1) FAO (French beans, avocados)

The FAO implemented the Smallholder Productivity and Profitability Project (ISSP, 2016 to 2018) with the financial support of USAID in five counties. The ISSP aims to improve the capacities of 70,000 smallholder farmers in productivity and marketing. The target crops are French beans, bananas, and tomatoes, and the target farmers selected these crops based on market demand. The project established a sales channel for bananas with Tiga Foods. The assistance policy of the FAO in Kenya is to increase the productivity and sales of subsistence crops. Thus, the FAO targeted avocados but at a lower priority than the other target crops. Tiga Foods received GLOBALG.A.P. certification, guaranteeing production quality from its contract farmers. The FAO views the major issues for the overall improvement of the VC as inefficiency and low levels of extension services owing to counties' weak governance. The FAO expects to collaborate with JICA on extension activities in the future.

(2) IFAD (Avocados, French beans, soybeans)

IFAD provided a total of 68 million USD of financial support to the Danish International Development Agency to implement the Natural Resource Management Project (NRMP) (2007 to 2013). The NRMP aimed to increase the production of alternative crops that avoid encroachment into natural wildlife habitats and, at the same time, improve environmental management. The project included avocados and French beans as its target crops and planned a new livestock project as of September 2019. The new project will support poultry in the Western region and goat and sheep breeding in the Northern region. The project will facilitate soybean cultivation to feed those livestock.

(3) USAID (Avocados)

USAID has implemented the Kenya Crops and Dairy Market System (KCDMS, 2017 to 2022) as part of the Feed the Future initiative. The KCDMS supports the market-oriented VCs of crops, including avocados and livestock, in 19 target counties. In a survey on the avocado VC in 2018<sup>58</sup>, the KCDMS reported that the production and exports of Kenyan avocados have increased in response to the increasing demand, especially in European countries. Although 70% of production depends on smallholder farmers, there are issues in the extension of production skills and transportation. USAID particularly points out the vulnerability of using counties as the administrative organization for providing extension services even though decentralization was implemented a long time ago. USAID helped to increase the incomes of 332,000 farmers (especially youth and women) by implementing the Kenya Agricultural Value Chain Enterprises

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<sup>58</sup> *Avocado Value Chain Assessment*, Kenya Crops and Dairy Market Systems Activity, USAID, September 2018

(2013 to 2018), which targeted horticulture crops, including French beans, livestock, and maize.

(4) AfDB (French beans, Avocados)

The AfDB financially supported the Small Scale Horticultural Project (SSHP, 2007 to 2015) commenced by IFAD in 19 districts of the arid and semi-arid (ASAR) regions, which are suitable for horticulture production. The SSHP targeted 6,000 farmers who cultivate French beans, avocados, tomatoes, and onions, and it established the Irrigation Water Users Association (IWUA) to maintain the project’s effects after the AfDB’s intervention. The IWUA has become sustainable because it was adequately organized from the beginning of the project. IWUAs produce and sell horticulture crops in the Kabaa irrigation pond in Machacos County and in the Lari Wendani irrigation pond in Narok County, which are examples of good practices. The SIVAP has been implemented as a successor to the SSHP in 15 counties starting in 2015. Both projects instruct cultivation after identifying the markets. AfDB supports the construction of warehouses, grading, and providing technical support on processing skills.

(5) WB (Avocados)

Since 2018, the WB has implemented the National Agricultural and Rural Inclusive Growth Project (NARIGP) (loan amount: USD 20 million) in 21 counties. The target farmers selected four to five target crops in each county, among which some farmers selected avocados. For instance, farmers in Murang’a County cultivate a variety of avocados for export. However, the production amount from each farmer is limited because they generally have little land to cultivate. In addition to Murang’a, the WB considers Kiringa, Meru, Nandy, and Hombay as potential counties for avocados. NAGRIP had just started to intervene in the target community when the survey was conducted in September 2019. The WB plans to facilitate collaboration with the private sector and strengthen the linkage between farmers and the market in Murang’a County.

Table 4-25 shows the viewpoints and additional information on three target crops provided by IFAD and USAID.

**Table 4-25: Comments and information from IFAD and USAID about the three crops**

	Soybeans	Avocados	French beans
IFAD	A feasibility study should be carried out regarding soybean varieties. Four varieties are grown in four different agro-ecological zones in Kenya, namely: a. Warm temperature sites: Hombay, Migori	It should be noted that avocados need a large cultivation area. Several varieties can be cultivated in Kenya. Most farmers who grow the Hass variety in Murang’a County are smallholder farmers with	French beans are mostly cultivated in the rain-fed areas in Kenya. French bean cultivation does not require large plots because they are harvested three times a year. Thus, smallholder farmers with under ½ to 1 acre of land

	<p>b. Moderate temperature sites: Kakamega, Embu</p> <p>c. Cool temperature sites: Eldoret, Nakuru</p> <p>d. Marginal rainfall sites: Busia, Lower Embu (Gachoka), Makueni</p> <p>Because soybeans are generally intercropped with maize, sugarcane, and bananas, interventions need to be made to change farming systems to achieve high volumes to sustain markets. Soybeans require more land to produce than French beans require.</p>	<p>fewer than five acres. Thus, the production area must be expanded to respond to the demand for exports. Kirinyaga, Kisii, Nyamira, Kakamega, and Hombay Counties are the key potential areas.</p>	<p>generally cultivate French beans in Kenya.</p>
USAID	NA	NA	<p>Warehouses with cooling systems are necessary and effective in decreasing post-harvest loss. It is recommended to set these warehouses in Eldered city or near KISM International Airport. With these facilities, traders do not need to transport French beans to warehouses in Nairobi, reducing transportation loss.</p>

Source: The Survey Team, based on interviews with IFAD and USAID

#### 4.8. Workshop Results

##### (1) Outline

Date: September 27, 2019 (Friday) from 9:30 to 13:00

Venue: Heron Pertico Hotel (Nairobi)

Participants: 48 (Government/Public institutions: 26, Private companies/Associations: 22)

Program: The basic schedule is as follows. The Survey Team organized the time allocation over the course of the survey in the five target countries.

Time	Activities	Responsibility
09:30–10:00	● Admission	● Survey Team
10:00–10:05	● Opening remarks	● JICA Kenya Office
10:05–10:15	● Introduction of participants ● Explanation of objectives, expected outputs, and program of the workshop	● Survey Team
10:15–10:30	● Presentation of the survey results and the concepts of the FVC development projects	● Survey Team (Dr. Kotegawa) Soybeans
10:30–10:45		● Survey Team (Dr. Ikeda) Avocados
10:45–11:00		● Survey Team (Mr. Machida) French beans

11:00–11:50	● Group discussion (three groups are formed by participants who have interest in the same target crop.)	● Survey Team
11:50–12:05	● Sharing of the results of each group's discussion, Q&A	● Survey Team (Soybeans)
12:05–12:20		● Survey Team (Avocados)
12:20–12:35		● Survey Team (French beans)
12:35–12:55	● Closing remarks	● Ministry of Agriculture, Livestock, and Fisheries
12:55–13:00		● JICA Kenya Office
13:00–14:00	● Lunch and networking (end of the workshop)	● Survey Team

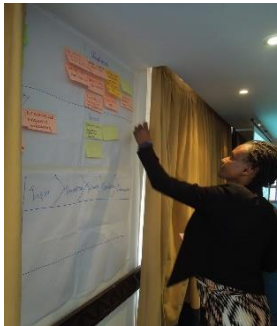
(2) Photos of the workshop



Active discussions in the workshop.



The Survey Team presenting the survey results.



The participants indicating and sharing their comments and information.

**4.9. Environmental and Social Legislative Framework Related to Agricultural Investment in Kenya**

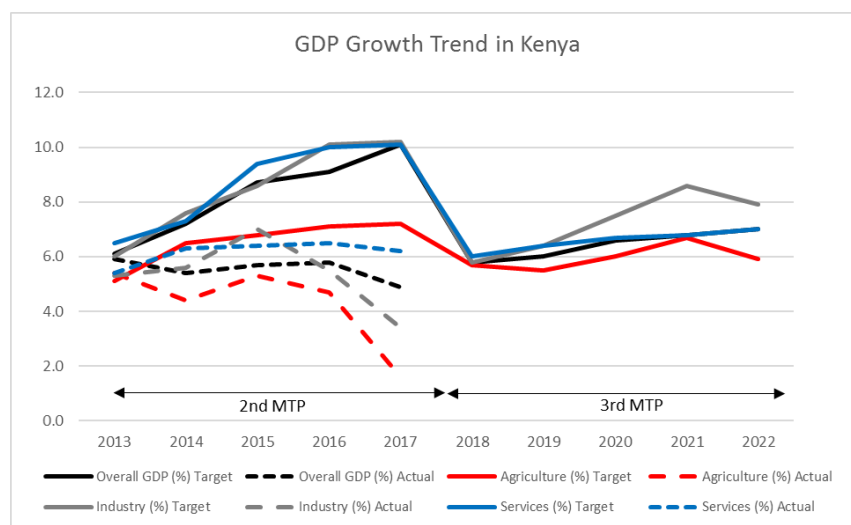
4.9.1. Legal framework related to environmental impact assessments in Kenya

(1) Kenya Vision 2030

The government of Kenya (GOK) formulated "Kenya Vision 2030" aimed at making Kenya a middle-income industrializing country by 2030, and it is promoting domestic and foreign investments in line with its economic development plan. The Kenya Investment Authority (KenInvest) was organized to promote the introduction of foreign capital, especially to the EPZs, and to aim for export-oriented industrialization. The agriculture sector, which accounts for about 20% of Kenya's real GDP (based on 2017 real GDP, approximately 960 billion KES) and about 50% of total exports (250 billion KES), is one of the promising investment sectors in Kenya Vision 2030, and a target annual rate of economic growth of 7% is set for agriculture.

(2) The Third Medium Term Plan (MTP III)

The Third Medium-Term Plan (MTP III) is designed to evaluate the performance of each sector that drove economic growth over the past five years and to formulate a new medium-term plan based on the results.



**Figure 4-33: GDP growth trend and forecast in Kenya**

Source: The Survey Team, based on MTP III

Analysis has shown that the cause of the recent

stagnation in the GDP growth rate of the agricultural sector is the impact of insufficient rainfall on major agricultural and livestock products, and the GOK continues to prioritize the development of irrigation facilities, including dams (See Figure 4-33). Thus, 22 flagship projects will be implemented in the agriculture and livestock sector from 2018 to 2022. Table 4-26 shows the flagship projects that are considered to be closely related to PPP and FVC development.

**Table 4-26: Major flagship projects and programs in Kenya’s agricultural sector**

Flagship Projects and Programs	Outline
Fertilizer Subsidy Program	The sector will continue its focus on agricultural productivity by improving the accessibility, affordability, and suitability of fertilizers. It will subsidize 200,000 MT of assorted fertilizers annually, coordinate soil analysis in beneficiary regions, and monitor and evaluate the impact of the subsidy program on crop production and productivity. The GOK, in collaboration with the private sector, will explore local manufacturing of ammonia, urea, DAP, and NPK fertilizers.
Agricultural Mechanization Program	With the aim of promoting agricultural mechanization and providing tractors at affordable prices for small and medium enterprises, the government will subsidize the sale of tractors (600 riding and 3,000 walking) to such enterprises, develop 28,000 acres in the fields of the state-owned agricultural development company, and increase seed production.
Food and Nutrition Safety	This program focuses on new and innovative initiatives that will drive food and nutrition security over the next five years by supporting enhanced large scale production, smallholder productivity and agro-processing, and reductions in food prices. Key targets include increasing major food production by the year 2022. Specifically, annual maize production will increase from the current average of 40 million (90 kg bags) to 67.4 million (90 kg bags); an additional 70,000 MT of rice will be produced annually to reach an annual production of 406,486 MT; and annual production of Irish potatoes is targeted to increase to 2.52 million MT by 2022. Increased production will be achieved through expanded production areas, enhanced access to quality inputs (seeds and fertilizer), irrigation, mechanization, and post-harvest management. The sector will also develop nutrition-sensitive indicators for use in agriculture.



Value Chain Support Program	This program involves improving the dairy value chain infrastructure; equipping a tea research factory in Kericho; and standardizing hides and skins
Agricultural Insurance Program	The GOK supports farmers in accessing agriculture insurance to manage risks and losses among smallholder farmers, increase crop productivity and livestock production through improved access to credit and technologies with higher yields, and support the transition from subsistence to commercially-oriented farming. Crop insurance will be expanded to cover 31 counties, and the livestock insurance program will be expanded to cover 500,000 households (2.5 million TLUs) in 14 counties in arid and semi-arid lands. Doing so will enhance the capacities of pastoral communities and stakeholders to use insurance products to reduce weather-related risks and rebuild their livelihood support systems in drought-prone areas.
Large Scale Production	This program focuses on cultivating an additional 700,000 acres through PPP, forming an Agriculture and Irrigation Sector Working Group to provide coordination for irrigated agriculture, and offering post-harvest technology incentives to reduce post-harvest losses from 20% to 15% by waiving duties on cereal drying equipment, grain silos, fishing and aquaculture equipment, and feed.
Promotion of Investment and Cooperation in Agriculture	This program includes attracting investments in agriculture, developing and transferring tools and technologies, and organizing/participating in international agricultural expos and food festivals. Further, it will support programs and projects by United Nations Agencies, development partners, the private sector, and other stakeholders and will advocate for the correction and prevention of trade restrictions and distortions in world agricultural markets.

Source: The Survey Team, based on MTP III

### (3) Agricultural Sector Development Strategy (2010 - 2020)

The Agricultural Sector Development Strategy (2010 -2020) is a policy document that sets out a ten-year development strategy for Kenya’s agricultural sector. This document describes the characteristics, challenges, opportunities, vision, and development strategy of the agricultural sector. It advocates environmental improvements and natural resource management, environmental conservation, and waste management.

### (4) The National Climate Change Response Strategy

The National Climate Change Response Strategy is a strategic document that outlines the framework Kenya’s action plan against climate change for the years 2010–2020. According to USAID<sup>59</sup>, the average annual temperature in Kenya increased by 0.34°C between 1985 and 2015 and is projected to increase by another 1.2–2.2°C by 2050. In addition, increases in annual precipitation (-3 to + 28%), worsening droughts, and changes in rainfall patterns are projected. Damage to crops and livestock from droughts between 2008 and 2011 is estimated at around USD 10.2 billion. In response, although the contributions to climate change from the agricultural sector are insignificant relative to those of other sectors and emissions from the agricultural sector are considered “survival emissions,” mitigation and adaptation measures are developed for each sector, including the agricultural sector. The following is the action plan developed for

<sup>59</sup> USAID (2013) Climate Risk Profile (Kenya)

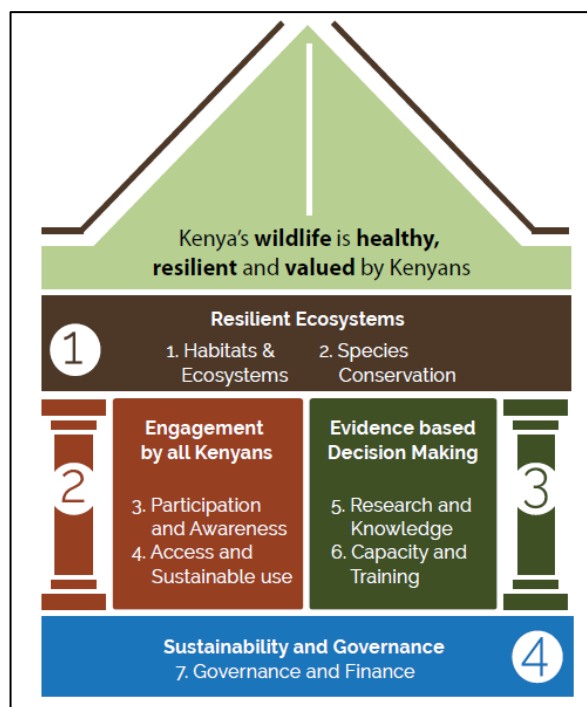
the agricultural sector to tackle climate change:

- ✓ Increasing the acreage of agriculture under irrigation
- ✓ Investing in water harvesting programs (e.g., construction of water pans)
- ✓ Providing farm inputs, such as fertilizers and environmental-friendly pesticides, through government subsidies
- ✓ Promoting conservation agriculture (agroforestry, soil, and water conservation)
- ✓ Providing financial and technical support to the orphan crops program
- ✓ Enhancing agricultural research, including with international collaborations

(5) National Wildlife Strategy 2030

The National Wildlife Strategy sets four focus areas and seven goals with the overall aim of achieving "Kenya's wildlife is healthy, resilient and valued by Kenyans" by 2030 (see Figure 4-34).

The description related to the agriculture sector includes Priority Area 4, "Sustainability and Governance," which plans to develop a sustainable and innovative compensation scheme for wildlife damage to crops and livestock at the national level. In practice, it is difficult for small farmers to pay for the purchase, installation, and maintenance of electric fences as a countermeasure to the increasing number of conflicts with wildlife, especially because of the recent population growth and the expansion of cultivated land. Various studies have been carried out in the past, but, for example, the grazing of maize by elephants has caused serious damage, especially in buffer zones adjacent to protected areas, and conflicts are increasing<sup>60</sup>.



**Figure 4-34: Outline of Kenya's National Wildlife Strategy 2030**

Source: National Wildlife Strategy 2030

(6) Ongoing and future trends in other related policies, laws, and regulations

Furthermore, MTP III states that the policies and regulations in Tables 4-27 to 4-29 will be

<sup>60</sup> For example, Sophia (2018), Impacts of Elephant Crop-Raiding on Subsistence Farmers and Approaches to Reduce Human-Elephant Farming Conflict in Sagalla, Kenya

reviewed and enforced by 2022. This list illustrates the interests and trends of the GOK. For example, limits to the subdivision of cultivated land are planned. Kenya's arable land is too frequently subdivided by inheritance and other factors, contributing to the decline in agricultural efficiency and productivity. In addition, this list mentions investment incentives for private and multinational companies and interest in advanced technologies, such as biotechnology. It is necessary to consider the latest updates to these related policies and laws when formulating investment plans in Kenya's agricultural sector.

**Table 4-27: Policies and strategies to be reviewed / developed in Kenya's agricultural sector by 2022**

Review the Agriculture Sector Development Strategy 2010-2020
Revise the National Agriculture Sector Extension Policy
Develop National Agriculture Insurance Policy
Develop Fiber Crops Policy
Develop Roots and Tubers Crops Strategy
Develop National Agricultural Mechanization Policy and Strategy
Develop National Agricultural Marketing Strategy
Develop National Rice Development Strategy (2018–2028)
Develop Food Waste Management Policy
Develop Food Safety Policy and Protocols for Food Defense
Develop Beef Industry Development Strategy
Develop Bee Health Regulations and Strategy
Develop Conventional and Emerging Livestock Breeding Strategy
Develop Hides and Skin, Leather, and Leather Products Development Strategy
Review National Vector Control Strategies
Develop Zoological Management Strategy
Develop Urban and Peri-Urban Agricultural Policy
Develop Agro-Chemical Industry Policy
Develop Organic Agriculture Policy
Develop Sugar Industry Policy
Develop Cereals Policy
Develop National Agricultural Soils Management Policy
Develop Climate Smart Agriculture Strategy
Develop Oil and Nuts Crops Strategy
Develop Agriculture Research Strategy
Develop a strategy to drive adoption of modern biotechnology in agriculture
Develop Agriculture Research Internationalization Strategy

Source: MTP III

**Table 4-28: Acts and regulations to be reviewed / developed in Kenya's agricultural sector by 2022**

Enact legislation to make soil liming mandatory
Enact legislation to cap the cost of leasing land to attract private/foreign investors
Enact legislation to halt the further subdivision of arable land
Enact Warehouse Receipt System Bill 2016
Enact the Food Security Bill of 2014
Develop a legal framework on pests of bees
Develop regulations on commodity levies (sugar)
Review the Hides, Skins, and Leather Trade Act (Cap 359)

Amend the Meat Control Act (Cap 366)
Develop guidelines on antimicrobials and the management of acaricide
Review regulations on food safety traceability
Review the legal framework on pest control, complete the pending Pest Control Products bill, and revise the regulations on pest control products

Source: MTP III

**Table 4-29: Institutional reforms to be enforced in Kenya’s agricultural sector by 2022**

Enforce the road legislation to eliminate multiple levies across counties
Enforce agriculture regulations for crops (e.g., tea, sugar, and potatoes)
Restore commodity levies
Operationalize the Veterinary Medicines and Drugs Authority
Establish the Miraa Research Institute
Modernize and convert Agricultural Technology Development Centers into Centers of Excellence
Transform the AIRC

Source: MTP III

(7) Environmental Impact Assessment (EIA)

In Kenya, guidelines for both Strategic Environmental Assessments (SEAs) and EIAs have been established, and the supervisory authority is the National Environmental Management Authority (NEMA). During the field survey, NEMA and the Ministry of Agriculture were interviewed, and they confirmed that the details of SEAs and EIAs have not changed from the situation described in the recent JICA survey reports for another development project<sup>61</sup>. NEMA decides whether a project proponent should submit an EIA report depending on the nature of the project. Of the fields that are highly related to FVC development, projects that may require carrying out EIAs are summarized in Table 4-30. With the exception of irrigation areas of 50 ha, "large-scale" has no clear definition, and the need for an EIA is determined on a case-by-case basis taking into account the characteristics of the project.

**Table 4-30: Projects that are subject to the EIA process in Kenya (fields related to the FVC)**

Category	Details
Changes in land use	including – (a) major changes in land use, (b) large scale resettlement schemes
Dams, rivers, and water resources	including – (a) any project located within a distance prescribed by a written law from a wetland, ocean, sea, lake, river, dam, stream, spring, or any other body of water, (b) storage dams, barrages and piers, (c) river diversions and water transfers between catchments, (d) large scale flood-

<sup>61</sup> The field survey confirmed that the information on SEAs and EIAs described in the following reports remains unchanged:

SEA: JICA (2017) Final Report on Project for Master Plan on Logistics in Northern Economic Corridor

EIA: JICA (2019) Final Report on Design Mission for Mombasa Special Economic Zone Development Project.

	control schemes, (e) drilling for the purpose of utilizing groundwater resources, including geothermal energy.
Agriculture	including – (a) large-scale agriculture, (b) introductions of new pesticide, (c) pest control programs (large scale), (d) widespread introductions of new crops and animals, (e) widespread introductions of fertilizer use, (f) irrigated agriculture exceeding 50 ha, (g) major developments in biotechnology, including the introduction and testing of genetically modified organisms.
Processing and manufacturing industries	including – (a) mineral processing and reductions of ores and minerals, (b) smelting and refining of ores and minerals, (c) foundries, (d) large-scale brick and earthenware manufacturing, (e) cement works and lime processing, (f) glass works, (g) explosive plants, (h) fertilizer manufacturing or processing, (i) oil refineries and petro-chemical work, (j) large-scale tanning and dressing of hides and skins, (k) large-scale abattoirs (more than 15 animals/day) and meat-processing plants, (l) large-scale brewing and malting, (m) bulk grain processing plants, (n) large-scale fish-processing plants, (o) pulp and paper mills, (p) large-scale food processing plants, (q) plants for the manufacture of motor vehicle, (r) plants for the construction or repair of aircraft or railway equipment, (s) plants for the manufacture of tanks, reservoirs, and sheet-metal containers, (t) plants for the manufacture of coal briquettes, (u) plants for manufacturing batteries, (v) chemical works and processing plants.

Source: Extracted from The EMCA Second Schedule (s.58(1), (4)), EMCA 2015

#### 4.9.2. Legal framework related to land acquisition and resettlement in Kenya

The latest land policy document in Kenya is "Sessional Paper No.1 of 2017 of National Land Use Policy" by the Ministry of Lands and Physical Planning. This document describes the current situation, challenges, and future directions for land in Kenya. For rural areas and the agriculture sector, the emphasis is placed on developing sector-specific land use guidelines for sustainable land use in rural areas, making effective use of arable land, and promoting commercial agriculture with value addition, etc. among others. The key legal framework to refer to in implementing investment projects involving land acquisition and resettlement in the Kenyan agricultural sector is summarized in Table 4-31.

**Table 4-31: Key legal frameworks related to land acquisition and resettlement in Kenya**

Law, Act, Regulation, etc.	Outline
<b>Constitution of Kenya</b>	<p>In Section 40, the Constitution stipulates that “The State shall not deprive a person of property of any description, or of any interest in, or right over, property of any description, unless the deprivation- (a) results from an acquisition of land or an interest in land or a conversion of an interest in land, or title to land, or (b) is for a public purpose or in the public interest and is carried out in accordance with this Constitution and any Act of Parliament that— (i) requires prompt payment in full, of just compensation to the person; and (ii) allows any person who has an interest in, or right over, that property a right of access to a court of law.” Furthermore, it is stipulated that “Provision may be made for compensation to be paid to occupants in good faith of land acquired under clause (3) who may not hold title to the land.”</p> <p><u>Relevance:</u> Many farmers, especially in rural areas targeted by agricultural investment projects, have no certificates of land ownership. These provisions should be referred to when determining the affected persons and compensation</p>

Law, Act, Regulation, etc.	Outline
	amounts.
<b>Land Act 2012</b>	<p>The Land Law stipulates that if the land of an individual is forcibly expropriated under the Act, the individual shall pay the full amount of compensation in advance in an appropriate manner after the rights and interests in the individual's land are determined, and the National Land Commission (NLC) shall establish rules for assessing the amount of compensation appropriately. The former Wayleave Act was integrated into the Land Act, and Sections 143-148 "Public Right of Way (ROW)" of that Act provides the definition and compensation concerning wayleaves.</p> <p><u>Relevance:</u> The definition and concept of the ROW are critical and relevant to any development project.</p>
<b>The National Land Commission Act 2012</b>	<p>This Law was enacted to improve land management and administrative procedures in Kenya through the establishment of the NLC. Important functions of the Commission are managing government land on behalf of the central and county governments, investigating land issues based on independent judgments or complaints and proposing appropriate grievance, and encouraging the use of traditional grievance mechanisms for land issues.</p> <p><u>Relevance:</u> The NLC is one of the most important stakeholders and should be appropriately consulted when implementing of projects involving land acquisition and resettlement.</p>
<b>The Valuers Act</b>	<p>This law stipulates the registration of valuers of lands and their duties.</p> <p><u>Relevance:</u> Only registered valuers are allowed to make assessments on lands. However, because there is no clear description of these assessment based on the replacement cost in this law and The Land (Assessment of Just Compensation) Rules, 2017, attention should be paid when land acquisition occurs owing to the implementation of this project.</p>
<b>Land Control Act</b>	<p>The law allows foreign companies to trade farmland only with the president's approval. However, the process for approval by the president is not clear, and it is practically difficult for foreign companies to acquire farmland. Non-agricultural land can be leased for periods up to 99 years.</p> <p><u>Relevance:</u> A foreign investor may own agricultural land indirectly by owning shares in a public company that owns agricultural land or may apply for an exemption from the president.</p>

Source: The Survey Team

#### 4.9.3. Current environmental and social considerations in Kenya

The current problems identified by this survey in terms of environmental and social considerations in Kenya are shown below.

- ✓ Business compliance is poor, and NEMA lacks the budget to monitor it. As a result, companies have, in some cases constructed structures that fail to meet not only environmental assessments but also technical standards. A typical example is a dam that collapsed in Nakuru in 2018. In this accident, about 50 residents living downstream were killed by a large amount of sediment that washed away, and agricultural land and crops were seriously damaged<sup>62</sup>.
  
- ✓ As Kenya has no national framework for land acquisition, compensation, and relocation,

<sup>62</sup> Hearing from Kenya Land Alliance, 2019 and the following news article:  
<https://www.standardmedia.co.ke/article/2001279876/20-people-killed-in-the-patel-dam-tragedy-in-solai-nakuru, Kenya>

project proponents need to refer to individual legal systems on a case-by-case basis, and these legal systems also have unclear interpretations. For example, The "Land Value Index Laws (amendment) Bill, 2018" aims to promote the implementation of appropriate compensation for project affected persons by adding land price indicators to the role of the NLC and by clarifying the meaning of "prompt compensation" in the Land Act<sup>63</sup>. However, the development of legislation has no significant progress as of August 2019. According to the Kenya Land Alliance, a local NGO working on land issues, part of the reason for this low progress is that the budget allocation is heavily weighted toward economic growth and development and the government assigns relatively low priority to land issues.

- ✓ Ineligible beneficiaries (e.g., an acquaintance or family member of a village mayor or a family member of a government official) are often included among the "affected persons." Solutions include building good relationships with local communities, establishing a project implementation system involving local NGOs, civil society, and so on.

#### **4.10. Legislative Framework for Agricultural Investment in Kenya**

As stated above, Kenya is promoting economic growth through the active utilization of private investment, and the specific legal framework started with the Kenya Investment Promotion Act, put in place in 2004. This law proposed establishing the "National Investment Commission: NIC" to make proposals to government institutions regarding the development of policies and systems necessary to promotion investments and PPPs. KenInvest was also established as a practical organization to promote investment. Investors can download an investment application form online (<http://www.invest.go.ke/one-stop-center/>) and obtain information on tax incentives and a free e-mail consultation. In addition, a "One Stop Centre" has been set up in Nairobi to centrally provide investors with the information and procedures that they need. In the One Stop Centre, representatives from each ministry and agency involved in investment are available, and investors can receive the following types of assistance<sup>64</sup>:

- ① Business Registration Service – Offers advice and helps investors register their companies;
- ② Department of Immigration – Offers advice and helps investors obtain the necessary permits and passes;
- ③ Kenya Revenue Authority – Offers advice to investors on matters relating to taxation in Kenya and assists them in registering for a Personal Identification Number (PIN) / Value Added Tax (VAT);

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<sup>63</sup> Natural Justice (2018)

<sup>64</sup> Kenya Investment Authority (2019)

- ④ National Environmental Management Authority – Offers advice and licenses for environmental impact assessments and management issues;
- ⑤ Kenya Power – Assists investors in power connections;
- ⑥ County Government of Nairobi – Provides advice and issues business permit licenses and any other approvals required by the county government; and
- ⑦ Export Processing Zones Authority – Offers advice to investors on the EPZ scheme and licenses and facilitates investors within the zones.

In addition, in November 2019, the Chief Cabinet Secretary of Kenya’s Ministry of Industry and Investment announced a national investment policy called the "Kenya Investment Policy" and the "County Investment Handbook" to support Kenya's foreign direct investment (FDI). Finalizing the Kenya Investment Policy has taken since 2017, when public comments on the draft were received. This policy sets forth the overall vision of “aim to become a core investment destination with a strong economic zone” for the realization of Vision 2030. The goals are to increase public and private investment by at least 32% of GDP by 2030 and to improve Kenya’s ranking on the World Bank's "Ease of Doing Business" list, which is an indicator of the global business environment. Furthermore, the policy emphasizes the establishment of the NIC, the review of the legal framework and investment incentives, and the realization of smooth investments that coexist with other important policies to improve the speed of decision-making related to investment promotion.

In addition, with the aim of actively disseminating information on investments to the public from each county, a "County Investment Handbook" was prepared mainly, targeting county governments (see Figure 4-35). This Handbook describes types of investments (DDI, FDI, etc.), investment promotion policies and legal systems, what counties should do to attract investors, ways to promote, points about acquiring land to consider, and services that KenInvest can provide to counties.



**Figure 4-35 County Investment Hand Book 2019 in Kenya**

Source: KenInvest (2019)  
<http://www.invest.go.ke/wp-content/uploads/2016/10/County-Handbook-final-PRINT-compressed.pdf>

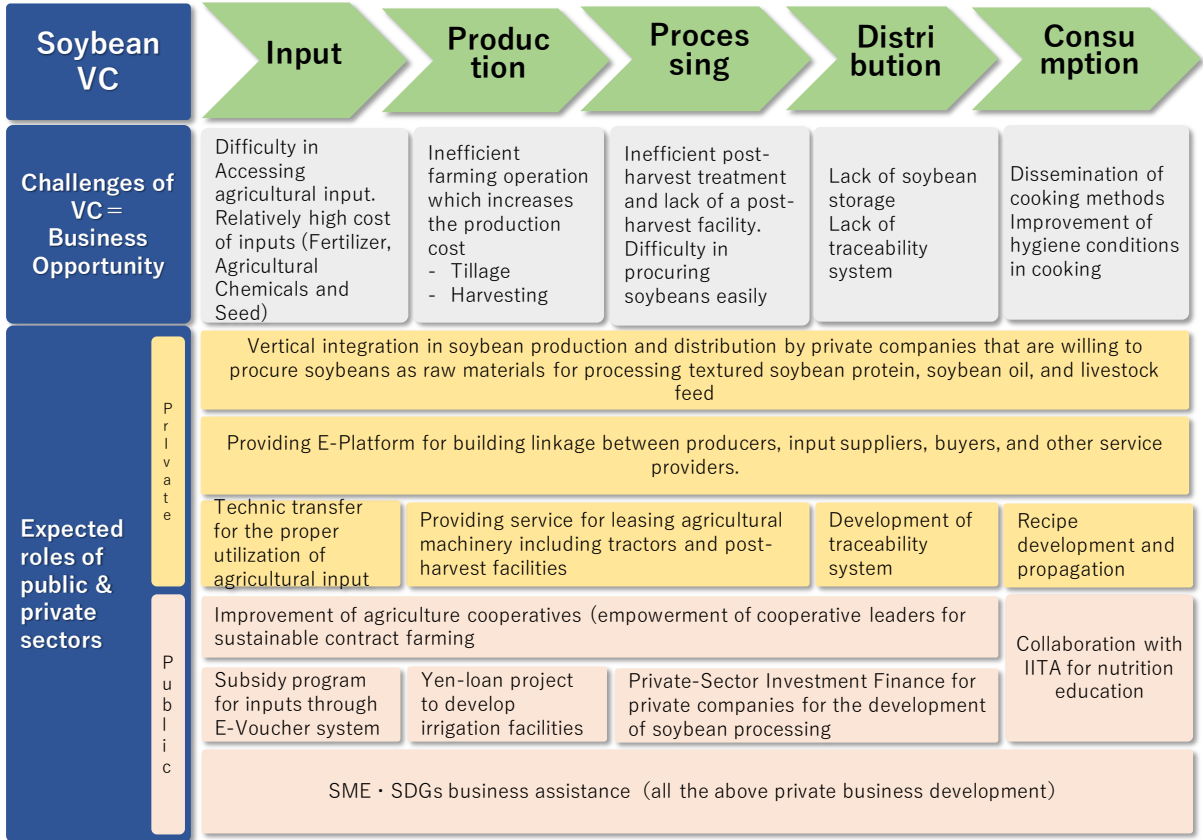


Additionally, tax incentives in EPZs and a case study of a company doing business in an EPZ are introduced in "Chapter 4.6. Large-Scale Agricultural Investment Projects."

**4.11. Concepts of PPP projects in Kenya**

**4.11.1. Soybean VC development projects**

At present, the challenges in the soybean VC are concentrated upstream (i.e., the input and production stages). It is primarily important to address these challenges and increase domestic soybean production. Doing so will require promoting contract farming and improving famers’ access to funds and inputs through digital platform services. At the same time, suppliers of agricultural materials are expected to provide technical extension services to farmers. However, it is difficult for immature farmers’ organizations to achieve sustainable contract farming with private companies and to access agricultural inputs and finance through digital platforms. For farmers and farmers' organizations to play a role in the private sector, strengthening farmers' organizations and providing technical guidance and support to promote standardized crop cultivation are required. The main reason for unstable soybean production is insufficient rainfall due to unseasonable weather, and the government’s promotion of irrigation development is expected to contribute significantly to the stable production and distribution of soybeans.



**Figure 4-36: Soybean VC development sheet in Kenya**

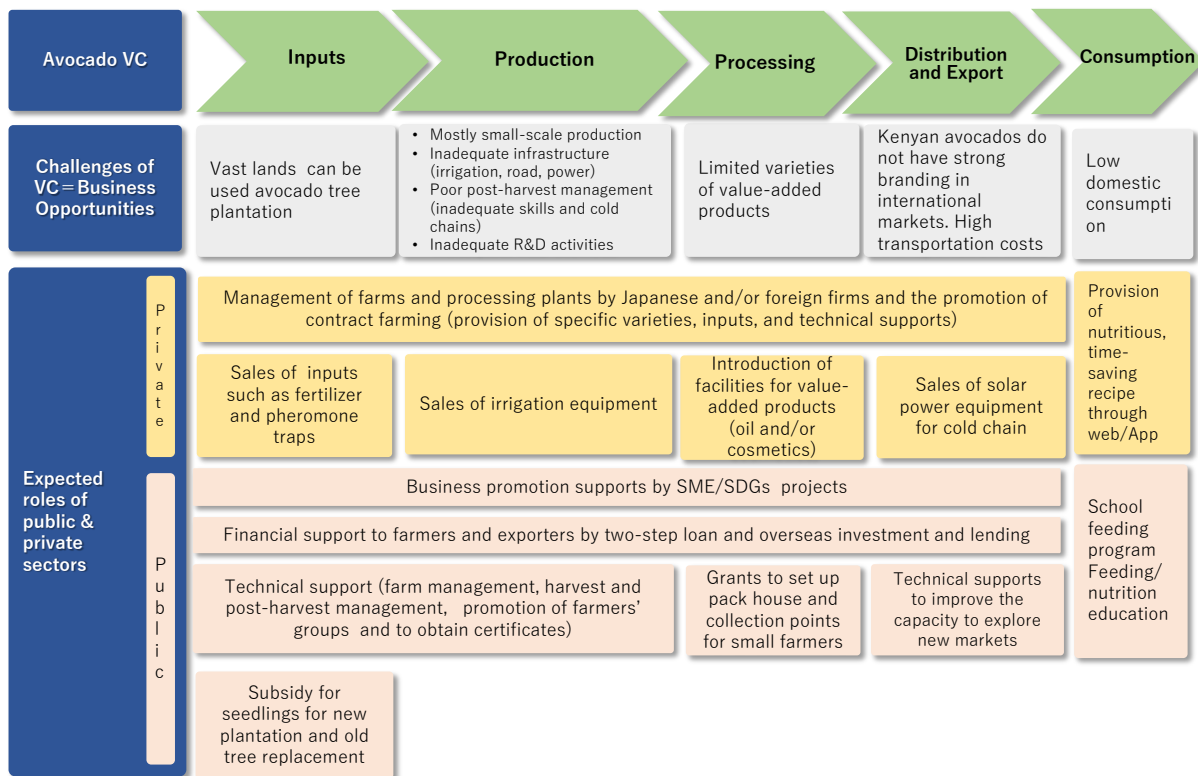
Source: The Survey Team

#### 4.11.2. Avocado VC development projects

Figure 4-37 shows some ideas for PPP projects for developing the avocado VC in Kenya. Private firms can provide and sell various goods to players in each process of the VC, which can upgrade the whole avocado VC. For example, firms can sell quality fertilizers that are not currently available to farmers, irrigation equipment that enables farmers to manage water better, refrigerator and reefer trucks to mitigate the limitations of cold-chains, and processing equipment and facilities that expand the capacity to produce high value-added products. Additionally, foreign firms can involve avocado production and processing management and provide technical support to local firms and personnel.

International donors can promote investment in this sector by providing investment and lending to avocado farmers, exporters, and processors. Additionally, technical supports can be given to farmers in terms of harvest and post-harvest management, which are serious issues in the VC. Furthermore, the provision of technical support to the Ministry of Agriculture to improve its capacities to explore new markets is also very useful.

The government of Kenya can provide financial support to farmers to purchases seedling of varieties for export variety mitigate the limited access to quality seedlings and can set up pack houses for groups of small farmers to increase their access to pack houses and export markets.

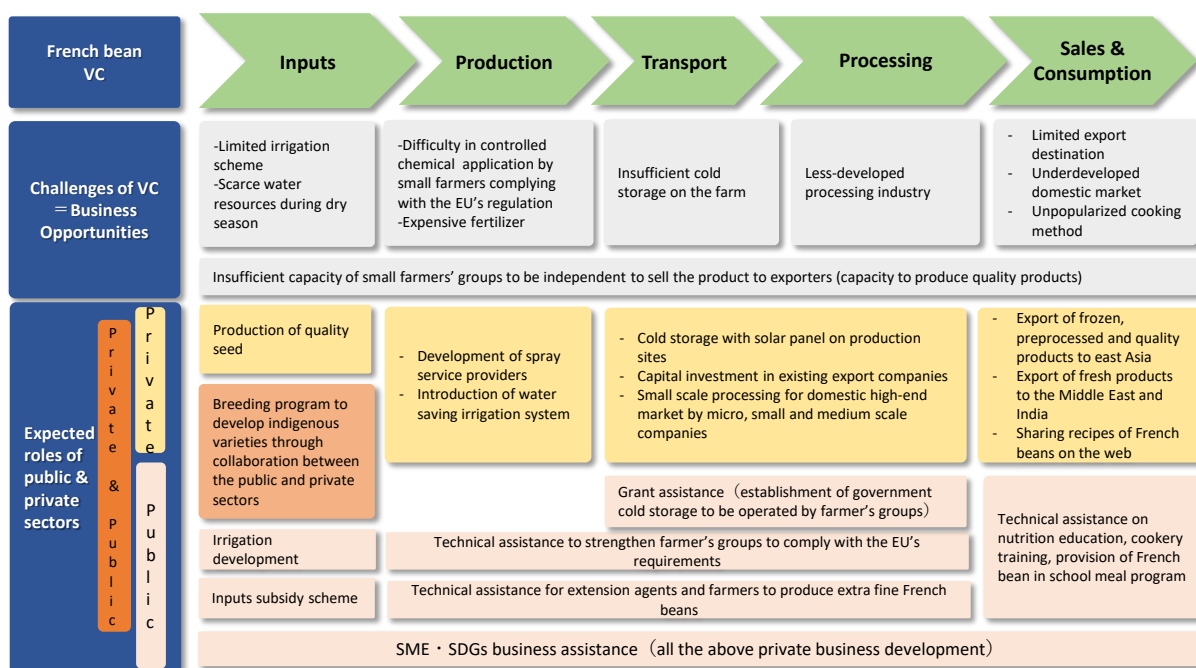


**Figure 4-37: Avocado VC development sheet in Kenya**

Source: The Survey Team

### 4.11.3. French bean VC development projects

Figure 4-38 shows concepts of projects for developing the French bean VC through PPPs. Among agricultural inputs, the import substitution of seeds should be addressed. Breeding, promotion, and dissemination programs are expected to be conducted through collaborations between the public and private sectors. One of the major challenges is pesticide application that complies with the MRLs of European countries, but small-scale individual farmers do not have the capacity for adequate pesticide application according to these standards. It is expected that private service providers, who spray pesticides appropriately, should be nurtured so that they can supplement small farmers' technical insufficiencies and create employment. Cold storage is a logistics issue. Cold storage on the field can store fresh French beans for a certain period, thus expanding the area of French bean production and increasing the number of farmers. Cold storage is preferably sourced from off-grid power, such as solar power generation. It can be constructed by the private sector, but it should be operated by the private sector. Investment in the processing sector is highly expected because only two companies produce and export processed French beans. Currently, the domestic market for French beans is very small. It is expected that the local market will be developed so that unexportable French beans can find a market in Kenya. Such development will increase the number of French bean farmers and attract more farmers to French bean production.



**Figure 4-38: French bean VC development sheet in Kenya**

Source: The Survey Team



## **Chapter 5. FVC survey in Tanzania**



## Chapter 5. FVC survey in Tanzania

### 5.1. Introduction to the FVC survey in Tanzania

The Survey Team studied the VCs of sesame, avocados, and macadamia nuts in Tanzania. Sesame is one of Tanzania's major exportable agricultural products, and Japan is one of the main destination countries for exported sesame. Tanzania's avocado production and exports have been increasing. Its production volume and exports of macadamia nuts are small, but farmers' and exporters' interest in macadamia nuts has recently been increasing. This chapter describes the results of the VC study and then presents the concepts of VC development projects through public-private partnerships.

### 5.2. Sesame VC

#### 5.2.1. Overview

Tanzania is a major sesame exporter, and Japan imports about 20,000-40,000 tons of sesame from Tanzania every year. From the perspective of FVC development, establishing a stable sesame production and supply system in Tanzania will not only support Japanese companies that handle sesame as a commercial product but will also serve to improve the livelihoods of sesame farmers in Tanzania. From this point of view, this survey summarizes the sesame supply chain's current status and issues, especially with regard to sesame exports from Tanzania to Japan. Figure 5-1 shows an overview of the sesame VC in Tanzania. The major inputs include sesame seeds, fertilizer, and pesticides, but fertilizer use is not common in sesame production in Tanzania. Most of the workers responsible for sesame production are small-scale farmers who do all of the cultivation work by hand except for tillage, which is performed using a rented tractor. The collection and distribution of sesame seeds was typically performed by middlemen and exporters in the past, but, in recent years, sesame seed collection in storage, with sales conducted through auction systems, specifically warehouse receipt systems (WRS), has begun. Most of the collected sesame seeds are carefully sorted and packed by exporters, and some of them are squeezed and consumed as sesame oil in Tanzania. Table 5-1 shows sesame prices at each stage of the VC.

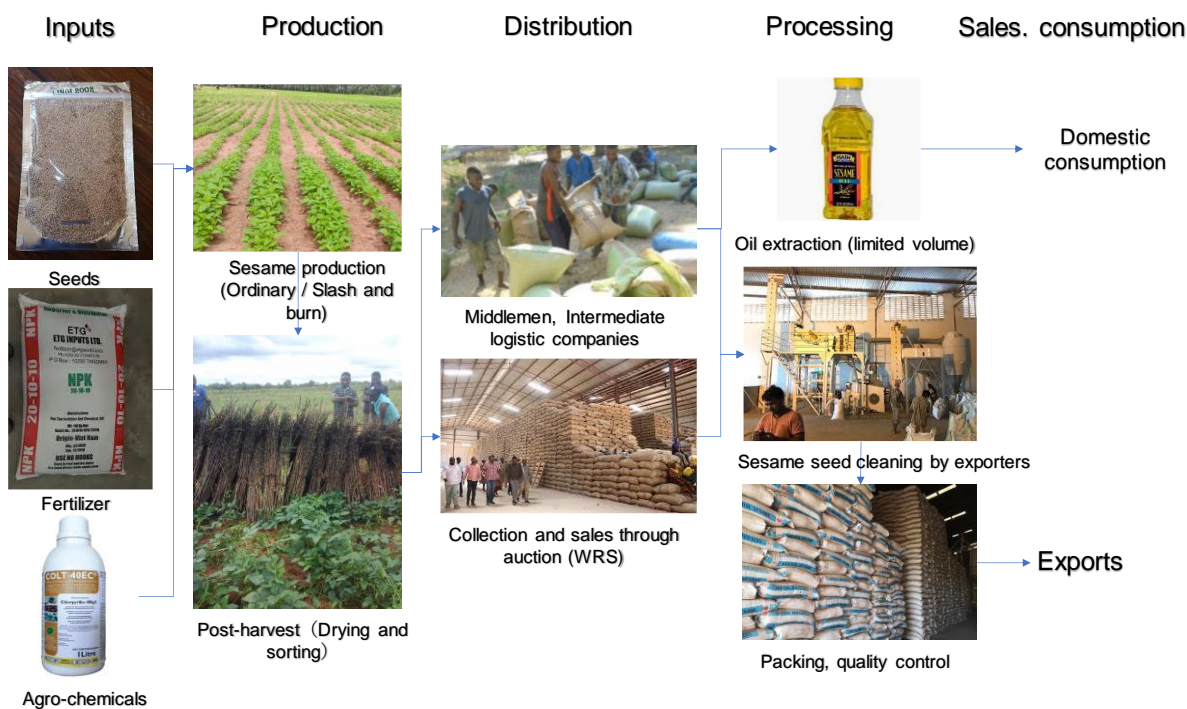
**Table 5-1: Sesame prices at each stage of the VC in Tanzania**

Farm gate price	2,000–2,800 TZS <sup>1</sup> /kg	96 Yen/kg–134 Yen/kg	(TZS =0.048 Yen)
Middleman→Retailer	2,500–3,300 TZS /kg	120 Yen/kg–158 Yen/kg	(TZS =0.048 Yen)
Retail price	4,200–5,000 TZS /kg	240 Yen/kg	(TZS =0.048 Yen)
Exports to Japan (for oil)	1.3 USD/kg	143 Yen/kg	(USD=110 Yen)
Exports to Japan (for food)	1.5 USD/kg	165 Yen/kg	(USD=110 Yen)

Source: The Survey Team

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<sup>1</sup> Tanzanian Shilling



**Figure 5-1: Outline of the sesame VC in Tanzania**

Source: The Survey Team

## 5.2.2. Agricultural inputs

### (1) Seeds

#### 1) Breeding of sesame varieties

In Tanzania, the Tanzania Agricultural Research Institute (TARI) is responsible for the development of sesame varieties. TARI has eight regional sites and nine sub-sites in Tanzania, but TARI-Naliendele, located in the Mtwara region, handles the development of sesame varieties. Table 5-2 shows the sesame varieties registered by TARI as of 2019. Many sesame farmers grow the Lindi-2002 variety. No black sesame varieties are registered in Tanzania, but TARI-Naliendele has started breeding black sesame varieties imported from China.

**Table 5-2: Sesame varieties registered in Tanzania**

Variety	Seed color	Yield potential (tons/ha)	Days to harvest	Oil content (%)
Naliendele 1992	White – Light brown	1.2	105–110	52
Lindi -2002	White – Light brown	1.5	100–110	55
Ziada	White – Light brown	1	120–130	58
Mtondo 2013	White – Light brown	1.3	94–103	No data
Mtwara 2009	Light brown – Dark brown	1.5	95–110	53

Source: TARI





Lindi 2002



MTWARA 09



Black sesame variety

Registration with the Tanzania Official Seed Certification Institute (TOSCI) is required to register new sesame varieties. To register a variety, the results of the Distinctness, Uniformity, and Stability (DUS) and National Performance Trial (NPT) tests must be presented to and approved by the National Variety Release Committee (NVRC), the National Performance Trial Technical Committee (NPT-TC), and the National Seed Committee. The materials, data, and procedures required to register a variety are summarized below.

DUS: The DUS trial must be submitted to TOSCI and should be conducted one season before the NPT trial. The application must include 1) sufficient seed quantity for the first DUS test, 2) data on variety characteristics, 3) an application fee (approximately 560 USD), and 4) test data from farm trials. When the required documentation and procedures have been completed, TOSCI performs a DUS test and, if there are no problems, provides a certification of DUS testing.

NPT: The NPT examination also begins with an application to TOSCI. The application must include: 1) the results of cultivation tests for the two most recent cropping seasons (for at least three locations in Tanzania), 2) sufficient seed quantity for the NPT test and a second DUS test, 3) application fees for the NPT and second DUS tests (about 650 USD for the NPT), and 4) other information to be requested. When the required documentation and procedures have been completed, TOSCI conducts at least one NPT test (for at least three locations in Tanzania) and a second DUS test.

The results of these DUS and NPT tests are reviewed by the NPTC-TC and provided to the NVRC. The NVRC reviews the NPT-TC review results, and, if there are no problems, the National Seed Committee approves the variety's registration. The NPT test requires the results of cultivation tests for the two most recent cropping seasons to be presented, meaning that the time required to register a sesame variety is usually about three to four years from the start of the

process. Sesame varieties introduced from member countries of the International Union for the Protection of New Varieties of Plants are exempt from the DUS test. In this way, it is possible to shorten the variety registration period if the variety is approved by a multilateral agreement.

2) Sesame seed production and distribution

Seeds in Tanzania fall into four categories: (1) pre-basic seeds, (2) basic seeds, (3) certified seeds 1, and (4) certified seeds 2. Each category is produced by a different organization, as summarized in Table 5-3. At present, only TARI can produce pre-basic sesame seeds. In addition to TARI, the Agricultural Seed Agency (ASA) and private seed companies are involved in the production of basic seeds and certified seeds 1. Certified seeds 1 are the first generation of basic seeds, certified seeds 2 are the second generation of these seeds, and certified seeds 1 and 2 are generally circulated in the market. In principle, organizations engaged in seed production must obtain seed production licenses from TOSCI and must undergo regular audits.

**Table 5-3: Organizations responsible for the production of each seed category in Tanzania**

	Pre-basic seeds	Basic seeds	Certified seeds 1	Certified seeds 2
Organization in charge	Research institutes, such as TARI	ASA, Private seed companies	ASA, Private seed companies	ASA, Private seed companies
Managing organization	TOSCI	TOSCI	TOSCI	TOSCI

Source: Based on reports from TOSCI staff

ASA, which produces and sells sesame seeds in the categories of basic seeds and certified seeds 1, currently focuses on seed multiplication and sales of Ziada 94 and Lindi 02. It will also start producing Mtondo 2013, a high-yield variety. In 2019, Tanzania produced about 800 tons of sesame seeds, 40% of which were procured from the ASA’s fields and the remaining 60% of which were produced by contract farmers. The price of sesame seeds is relatively high at about 6,000 TZS/kg, but the number of farmers who wish to purchase sesame seeds at this price has recently increased rapidly owing to growth in demand. The ASA sells seeds through private wholesalers and retailers.

Tanzania also has a seed category called quality declared seeds (QDS). This category is used when adopting the community-based seed production (CBSP) approach, through which seed producers in the community produce seeds from certified seeds and sell the harvested seeds to sesame producers in the community. The major difference between QDS and the other four seed categories is TOSCI’s degree of involvement. Specifically, TOSCI is required to audit the production of basic and certified seeds, but it is less involved in QDS production.

## (2) Fertilizer

Fertilizer use is not common in sesame production in Tanzania. According to interviews with TARI and the ASA staff, although it is known that fertilization increases sesame yields, there is a lack of awareness and technical dissemination among farmers. In addition, although improvements have been made in recent years, staff members pointed out that fertilizer application needs to be disseminated in combination with the introduction of fertilizer-resistant certified seeds because many farmers still use recycled seeds.

## (3) Agro-chemicals

The main agro-chemicals used in sesame production in Tanzania are pesticides and herbicides. Pesticides are commonly sprayed by many sesame farmers in Tanzania in the flowering and fruiting stages. Herbicides, in contrast, tend to be used more frequently by farmers who produce sesame on a relatively large scale, especially in southern Tanzania. In addition, sesame seeds sold by the ASA or private seed companies are treated with agro-chemicals to disinfect the seeds and prevent quality degradation (Figure 5-2).

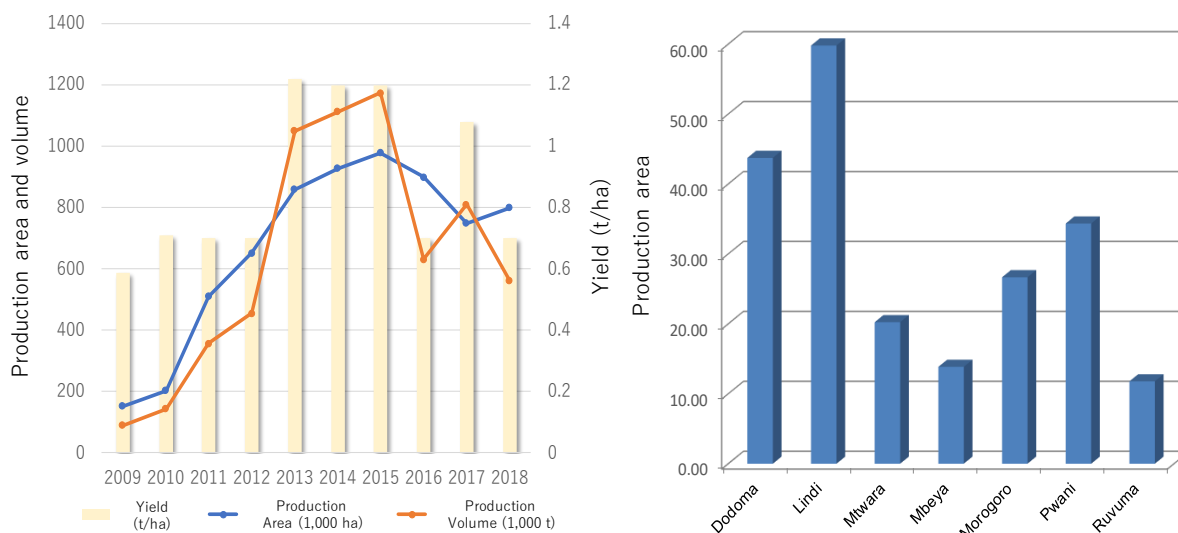


**Figure 5-2: Agro-chemical-treated sesame seeds**

### 5.2.3. Production

#### (1) Current sesame production in Tanzania

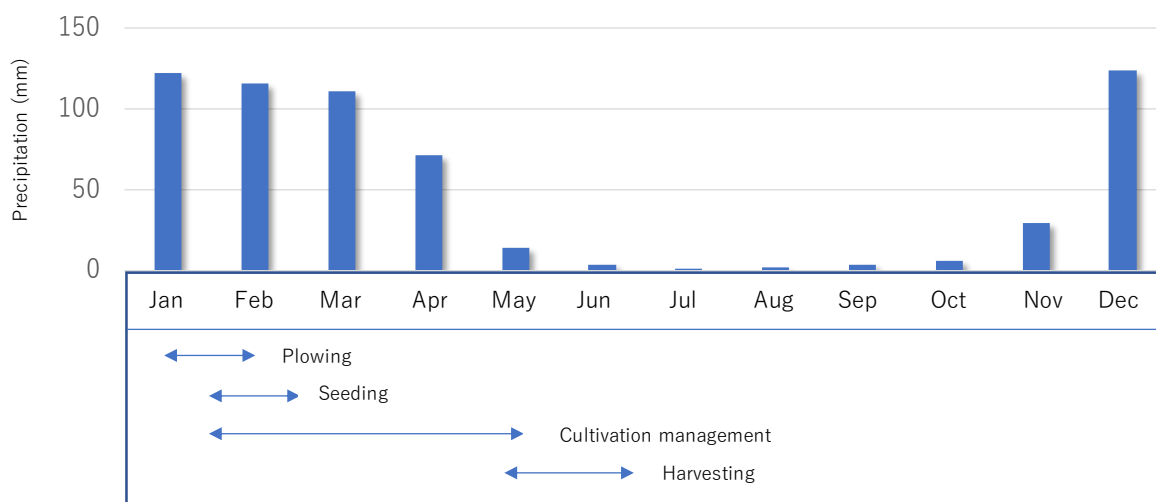
Figure 5-3 (left) shows statistical data on sesame production in Tanzania over the last ten years (2009–2018). Tanzania's sesame production area increased rapidly after 2010, leading to an increase in production volume. However, the sesame production area has not changed much in recent years, and Tanzania's sesame production area is currently about 800,000 ha. The sesame yield is not stable and falls in the range of approximately 0.5–1.2 tons/ha. Figure 5-3 (right) shows the major sesame production areas in 2017. The region with the highest sesame production is Lindi in southern Tanzania, followed by Dodoma and Pwani.



**Figure 5-3: Sesame production in Tanzania (left) and major sesame-producing regions in 2016 (right)**  
 Source: FAOSTAT, TARI

(2) Sesame cropping calendar in Tanzania

Figure 5-4 shows the annual precipitation patterns and sesame cropping calendar for Dodoma. In Tanzania, plowing work (mainly by rented tractors) is carried out during the rainy season, and sowing work is carried out around February. The harvest occurs around May–June, when the rainy season ends.



**Figure 5-4: Sesame cropping calendar and annual rainfall patterns in Dodoma**  
 Source : Climate.data.org and the Survey Team

(3) Conventional sesame cultivation practices

The sesame production practices of Dodoma, Morogoro, and Pwani in central Tanzania are slightly different from those of Lindi and Mtwara in southern Tanzania. The two cultivation practices are described in detail below.

- Central Tanzania: Sesame is cultivated in ordinary fields. The plowing work is mainly performed by rented tractors, and sowing follows. During the cultivation period, weeding is carried out one to two times, and harvesting is carried out 90 to 130 days after sowing. The harvested sesame is then dried and threshed for approximately one to two weeks and, finally, is shipped in 100-kg bags.
- Southern Tanzania: Sesame is cultivated in slash-and-burn fields. After sesame is cultivated, the land is fallowed, and the farmers cultivate different land the following year. Farming begins with clearing and burning vegetation, followed by soil preparation and sowing. The subsequent farm operations are essentially the same as those in central Tanzania, but many farmers in southern Tanzania spray herbicides as a substitute for weeding.

Table 5-4 compares the income from sesame cultivation in Morogoro and Lindi based on interviews with sesame farmers in both locations. In the Morogoro region, yields are as low as 270 kg/acre owing to the use of local varieties and the fact that no fertilizer is applied even though sesame is cultivated in ordinary fields. By contrast, in Lindi, the yield is twice as high as in Morogoro because of the use of certified varieties and the addition of organic matter and plant and wood ash through the use of slash-and-burn agriculture. Although production costs in Lindi are nearly twice as high as those in Morogoro because slash-and-burn farming practices are higher cost, the returns are higher for Lindi farmers than for Morogoro farmers. According to TARI staff, farmers in southern Tanzania, such as those in Lindi and Mtwara, are aware that "sesame grows well in virgin soil." Reflecting the rise in sesame market prices in recent years, sesame cultivation through slash-and-burn farming and the resulting deforestation have become serious issues. In fact, sesame cultivation using the slash-and-burn method is considered to be more advantageous than sesame cultivation without fertilization, but realizing sustainable sesame production requires establishing and disseminating sesame cultivation technology in ordinary fields combined with fertilization technology.

**Table 5-4: Comparison of the revenues of sesame-producing farmers in Morogoro (left) and Lindi (right)**

1. Income				
Category	Item	Yield (kg/acre)	Unit price (TZS/kg)	Income (TZS)
Sales	Sesame	270	2,800	756,000
Total income (TZS/acre)				<b>756,000</b>

2. Cost				
Category	Item	Quantity/acre	Unit price (TZS)	Cost
Input	Seeds	2	3,000	6,000
	Fertilizer	0	0	0
	Insecticides	1	500	500
Production	Land preparation (Rented tractor)	1	50,000	50,000
	Seeding	1	30,000	30,000
	Weeding × 2 times	2	40,000	80,000
	Harvesting, Drying	1	30,000	30,000
Post-harvest	Threshing	1	20,000	20,000
	Employment of watchman	1	20,000	20,000
Distribution	100kg bag × 3/acre	3	5,000	15,000
Total cost (TZS/acre)				<b>251,500</b>
3. Revenue (TZS/acre)				<b>504,500</b>

1. Income				
Category	Item	Yield (kg/acre)	Unit price (TZS/kg)	Income (TZS)
Sales	Sesame	540	2,800	1,512,000
Total cost (TZS/acre)				<b>1,512,000</b>

2. Cost				
Category	項目	Quantity/acre	Unit Price (TZS)	Cost (TZS)
Input	Seeds (Lindi 02)	2	12,000	24,000
	Fertilizer	0	0	0
	Insecticides	1	500	500
	Herbicides	1	70,000	70,000
Production	Land clearing	1	70,000	70,000
	Burning, Land preparation	1	30,000	30,000
	Seeding	1	30,000	30,000
	Inter-tillage	1	75,000	75,000
	Spraying herbicide	1	15,000	15,000
Post-harvest	Harvesting, Drying, Threshing	1	120,000	120,000
Distribution	100kg bag × 6.5/acre	6.5	5,000	32,500
Total cost (TZS/acre)				<b>467,000</b>
3. Revenue/acre (TZS)				<b>1,045,000</b>

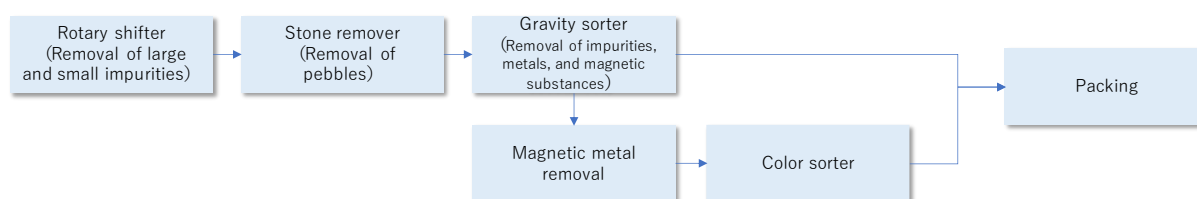
Source : Survey team

Source : Survey team

## 5.2.4. Processing

### (1) Cleaning

Most of the sesame produced in Tanzania is exported. The collected sesame is stored in the exporter's warehouse, and the necessary cleaning process is carried out according to the customers' requirements. The general flow of the sesame cleaning process is shown in Figure 5-5. The choice to use a color sorter depends on whether the sesame is intended to be used for oil extraction or for eating, and the demand for edible white sesame is particularly high in the Japanese market.



**Figure 5-5: Sesame cleaning process in Tanzania**

Source: The Survey Team

### (2) Quality control

Sesame products for the Japanese market have higher quality standards than those for exports to other countries. To handle this situation, some sesame exporters have outsourced the quality control of their products to companies that specialize in quality control. Quality control for sesame involves the following steps.

Sesame supplier identification: Exporters' source of sesame depends on the export destination. Specifically, sesame seeds for Japan are procured from the central part of Tanzania (e.g., Dodoma and Morogoro), whereas sesame seeds for other countries, including China, are procured from the southern part of Tanzania (e.g., Lindi and Mtwara). According to one exporter, sesame seeds for Japan are sourced from central Tanzania, where pesticide residues are frequently detected in sesame seeds. In southern Tanzania, pesticide residues are high because (1) surplus certified seeds treated with agro-chemicals are mixed in crop bags and (2) sesame seed production fields are adjacent to cashew nut production fields, meaning that some agro-chemicals from cashew nut production may drift.

Sample extraction and analysis: A quality control company collects the necessary number of samples (several samples per 500 tons) of imported sesame materials and performs various analyses (e.g., water content, oil content, residual agro-chemicals, etc.) of sesame quality. When the analysis results indicate that the export destination's quality standard is satisfied, processing proceeds to the next step. However, if the pesticide residue exceeds the export destination's quality standard, exports to that country are suspended at this point.

- Packing: Basic analyses (e.g., foreign material content, oil content, free fatty acids, water content, and aflatoxins (e.g., total, B1, etc., as three types are generally used)) are performed every three hours.
- Shipping: Management work (e.g., quantity checks, address checks, cargo status checks, etc.) is carried out when the product is released to a ship. In addition, product samples are kept for 90 days.

It has not been confirmed that business partners for sesame exports require the acquisition of, for example, GLOBALG.A.P certification. However, sesame exporters have acquired Hazard Analysis and Critical Control Point certifications, International Organization for Standardization certifications, and other certifications of quality and sanitation management in sesame cleaning and packing.

#### 5.2.5. Distribution

In the past, sesame seeds were generally transported via a collection point established by consumers (intermediate logistics companies and exporters), but the operation of a distribution system involving the bulk collection and auction of sesame seeds (i.e., a WRS) has begun as a result of Tanzanian government policy. This system is based on the Warehouse Receipt Act issued in 2005 and the WRS Regulations issued in 2016 for the stated purpose of "streamlin[ing] existing marketing systems with the aim of minimizing various constraints that hinder effective production

and marketing of agricultural products." The specific operation method is as follows.

- (1) Sesame seeds harvested by farmers are stored in warehouses managed by agricultural marketing co-operative societies (AMCOSs). When receiving the sesame, the manager of the AMCOS storage checks the sesame’s quality and quantity and refuses to receive it if the quality standard is not met.
- (2) After a certain volume of sesame has been collected, the AMCOS sets the date, time, and place of an auction and announce it to the buyers willing to participate.
- (3) The auction is managed by the AMCOS, and the volume of transactions is determined sequentially starting with the highest bidder.

Figure 5-6 shows an excerpt of the auction rules and conditions published in Lindi in 2019. Buyers are required to purchase 50 tons of sesame or more, and sellers are given the right to refuse transactions even after selecting buyers. The terms of payment are also explained, and they are advantageous for the seller.



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**Email:lindimwambaocoopunion@yahoo.com**

**SALES CATALOGUE LINDI MC**  
**TERMS AND CONDITIONS**

1. All sales shall be based on sealed bid and shall be governed by the Tanzania laws and regulations.
2. A buyer who has not paid full payment of his/her latest won auction shall not be allowed to participate in the following auction.
3. Bidding shall be one day before the auction date from 08:00 am to 04:00 pm
4. Each buyer shall put forward his offer of not less than 50 metric tons of raw sesame
5. The right to reject an offer remains with the seller.
6. The sale unit shall be in Tanzania shilling per kilogram.
7. The winner shall sign payment commitment document before issuance of sales invoice at the respective cooperative union’s office within 12 hours after notification.
8. The buyer shall make full payment for the raw sesame he/she has won within 2 working days from the date of auction.
9. Buyers are advised to open an account where sellers’ bank account exists as to facilitate easy and smooth money transfers.

SALES NUMBER:	SIX
DATE OF AUCTION:	13/07/2019
WAREHOUSE OPERATOR:	AMCOS
TIME OF AUCTION:	10:00:00 AM, AT KINJUMBI AMCOS

SUMMARY	
BAGS	1,307.06
WEIGHT KGS	65,353
GRADE	UN GRADED
COLOUR	WHITE SESAME (80%)
PURITY	98%

**Figure 5-6: Rules and conditions for sesame auctions held in Lindi**

Source: Lindi Region

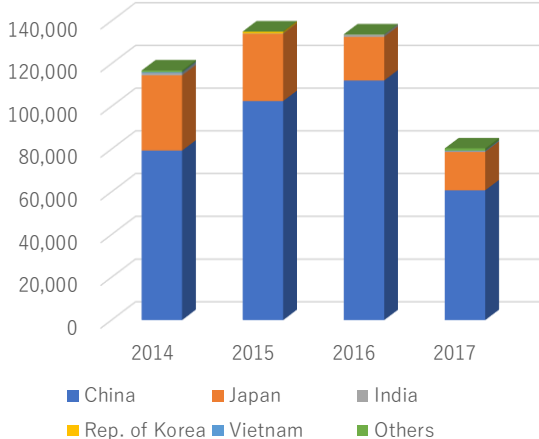


The distribution of sesame via the WRS has been favorably received by farmers and AMCOSs partly because the selling price of sesame has increased through the use of an auction. Although the WRS does not require all sesame growers to sell sesame to storage managers (i.e., AMCOSs), farmers can easily recognize the benefits of higher selling prices through auctions, and sesame distribution through the WRS is expected to become common in the future. Conversely, intermediate distributors and exporters of sesame are struggling with rising prices of raw materials, and other problems, such as the quality of sesame purchased at auction not matching the quality indicated by the auction conditions, have arisen.

5.2.6. Imports, exports, and the domestic market

5.2.7. Imports and exports

Figure 5-7 shows the destinations and annual export volumes of Tanzanian sesame for 2014–2017. Tanzania's annual export volume of sesame is about 80,000–120,000 tons, and the country with the largest export volume is China, followed by Japan. Exports to China account for about 68%–84% of Tanzania's sesame exports. Japan's sesame imports from Tanzania are generally around 20,000–40,000 tons/year. Other export destinations include India, South Korea, and Vietnam, but their volumes are smaller than those of exports to China and Japan.



**Figure 5-7: Annual sesame exports from Tanzania**

Source: UN Comtrade

(1) Domestic market

In Tanzania, sesame is regarded as an export crop, and very little is consumed domestically. Although some private companies manufacture and sell sesame oil, the volume of domestic distribution is extremely small, and consumption is generally low.

5.2.8. Policies and the role of the government

According to the Agricultural Sector Development Programme Phase II (ASDP II) 2018–2030, sesame is part of the oilseed sector and is designated as one of the priority commercial VCs, with southern Tanzania (Lindi, Mtwara) designated as the priority region. The goal of the oilseed sector is to increase Tanzania’s self-sufficiency rate of cooking oil (i.e., reducing the dependence on imported palm oil to 50%). The plan includes 1) improving productivity through variety development and dissemination and soil fertility management and 2) providing incentives to farmers' organizations for activities such as sesame collection, selection, marketing, and exports

(to increase farmers' profits by 50%). However, there are no clear measures to foster the sesame oil extraction industry and increase the consumption of sesame as cooking oil.

#### 5.2.9. Issues and opportunities

The issues and opportunities for the development of Tanzania's sesame VC can be summarized as follows. Table 5-5 provides the SWOT analysis results.

##### (1) Issues

In Tanzania, sesame is an export crop, and its price depends on the international market price. To improve the competitiveness of Tanzanian sesame in the international market, it is necessary to increase the efficiency of venture capital in each stage and to stably produce commercial products that meet market needs. From this viewpoint, the problems facing the sesame VC are summarized as follows:

- ✓ Increased production and spread of quality seeds: Although high-yielding varieties with high oil content have been developed and disseminated in Tanzania, their supply to the market is limited. Assuming a sesame production area of 800,000 ha and a seed quantity of 5 kg per 1 ha in Tanzania, a simple calculation shows that approximately 4,000 tons of seeds are required. However, the ASA produces about 700 tons of seeds, and it is not possible to meet the remaining demand with the amount of seeds handled by other private seed dealers.
- ✓ Widespread use of sesame production technology and improved access to finance: In southern Tanzania, sesame production by slash-and-burn farming is customary, but conversion to regular farming is necessary from the perspective of sustainability and forest protection. However, farmers' lack of funds limits their procurement of inputs.
- ✓ Improvement of sesame distribution via WRS: Sesame distribution via WRS requires thoroughly controlling sesame quality on the sales side. Currently, the quality of sesame procured through auctions does not meet quality standards, so intermediate distributors and exporters need to carry out additional drying and sorting of the sesame procured through auctions. In addition, the high frequency of pesticide residue detection also increases quality control costs, which may increase the procurement price of sesame and, consequently, reduce price competitiveness in the international market.

##### (2) Opportunities

International demand for sesame seeds is growing, and Tanzania, which has ample room to expand sesame seed production, has great potential. The sesame varieties developed and widely used in Tanzania have a high oil content and are highly competitive in the sesame oil extraction market. Although the production and domestic distribution of sesame materials face challenges,

the fact that knowledge and technology have accumulated in sesame processing and quality control at the time of export is one of Tanzania’s strengths. Demand for black sesame is high in China and Japan, and the promotion of black sesame production (specifically, the development and popularization of black sesame varieties) is one way to differentiate black sesame from white sesame, which is generally distributed in the international market.

**Table 5-5: Results of the SWOT analysis regarding sesame in Tanzania**

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>● Tanzania has a wide area of flat farmland suitable for sesame production.</li> <li>● Cultivars with high oil content and high yields have been developed and disseminated.</li> <li>● Sesame supply chains to foreign countries, such as China and Japan, have already been established.</li> <li>● A quality control system by sesame exporters has already been established.</li> <li>● Sesame-producing farmers' profits have improved as a result of the WRS consolidated sesame collection and auction system.</li> </ul>	<p><b>Weakness</b></p> <ul style="list-style-type: none"> <li>● The production volume of basic and certified sesame seeds is limited, and it cannot meet demand.</li> <li>● The agricultural work of small-scale farmers is not typically mechanized, and its efficiency is poor.</li> <li>● The amount of fertilizer input is extremely limited owing to insufficient dissemination of fertilizer technologies, farmers’ limited access to finance, and insufficient funds for the procurement of inputs.</li> <li>● In some cases, the quality of sesame procured through the WRS does not meet the standards, but no corrective actions are taken when this situation occurs.</li> <li>● Pesticide residues exceeding the standard level have been detected in raw sesame materials procured from some production areas. This issue is caused by contamination from sesame seeds treated with agro-chemicals and the drift of agro-chemicals used for other crops.</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>● Demand for sesame ingredients from the international market (especially China and Japan) is strong.</li> <li>● Demand for black sesame from China and Japan is high.</li> </ul>	<p><b>Threat</b></p> <ul style="list-style-type: none"> <li>● The price of sesame depends on the international market price. The WRS's bulk sesame collection and auction system raises the price of raw materials, potentially reducing the price competitiveness of Tanzanian sesame.</li> <li>● Sesame production by slash-and-burn farming is not sustainable. It can also lead to deforestation and the loss of existing forest resources (e.g., African Blackwood, etc.).</li> </ul>

Source: The Survey Team

**5.3. Avocado VC**

5.3.1. Overview

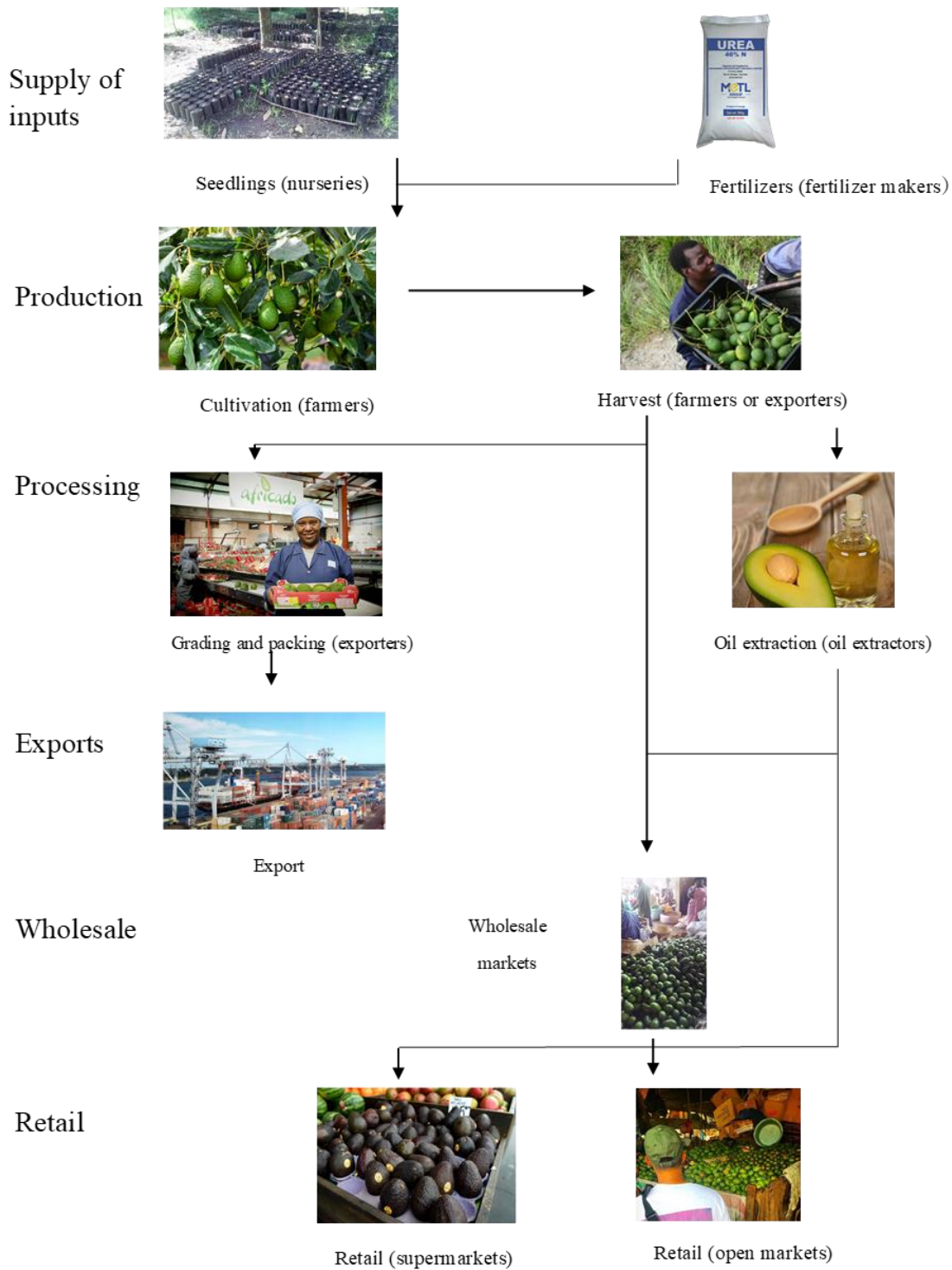
Figure 5-8 provides an overview of the avocado VC in Tanzania. Approximately 5% of avocados produced in Tanzania are exported. All of the exported avocados from Tanzania are of the Hass variety. The major avocado production sites are the Arusha and Kilimanjaro regions in the north; the Mbeya, Njombe, Iringa, and Songwe regions in the south; and the Kagera and

Kigoma regions in the West. Avocado seedlings are available from agricultural input shops, which are located in many rural areas in Tanzania, but many farmers face difficulties obtaining high-quality seedlings outside of the Arusha and Kilimanjaro regions in the north and the Mbeya, Njombe, and Iringa regions in the south, which are major avocado production sites. Avocado exporters in Tanzania organize groups of farmers as their out-growers and require them to obtain GLOBALG.A.P certificates. EU countries are the major destinations of exported avocados. Table 5-6 shows avocado prices in each stage of the value chain.

**Table 5-6: Prices of Tanzanian avocados**

Farm gate prices	For export	47-70 JPY/kg	(1 TZS = 0.047 JPY)
	For the domestic market	28-38 JPY/kg	(1 TZS = 1.09 JPY)
Domestic retail price (Kisutu market)		140 JPY/kg	(1 TZS = 1.09 JPY)
Exporters' selling price (free on board (FOB))		196 JPY/kg	(1 EUR = 118.9 JPY)
Retail price at a foreign market (Netherlands)		1,180 JPY/kg	(1 EUR = 118.9 JPY)

Source: The Survey Team



**Figure 5-8: Overview of the avocado VC in Tanzania**

Source: The Survey Team

### 5.3.2. Agricultural inputs

#### (1) Seedlings

Avocado seedlings are available at nurseries, which are located in many rural areas in Tanzania,

but many farmers face difficulty obtaining high-quality seedlings outside of the Arusha and Kilimanjaro regions in the north and the Mbeya, Njombe, and Iringa regions in the south, which are major avocado production sites. Many seedlings whose varieties are not clearly identified are sold<sup>2</sup>.

Seedlings of Hass avocados are available from privately-owned nurseries and at the Research and Training Centers of the Ministry of Agriculture in the Arusha and Mbeya regions. The price of seedlings is 2,500–5,000 TZS at private nurseries and 2,000 TZS at the Research and Training Centers<sup>3</sup>. However, their price is about 7,000 TZS in the areas surrounding Lake Victoria, where there are no nurseries for Hass avocados owing to transportation costs<sup>4</sup>.

In addition, some avocado exporters grow avocado seedlings and sell them to their out-growers at the price of 4,000 TZS each<sup>5</sup>.

(2) Fertilizers and pesticides

Fertilizers and pesticides are available at agricultural input shops, which are located in many rural areas in Tanzania. Pests and disease are not serious problems in avocado cultivation in Tanzania. However, codling moths and fruit flies cause some damage in high precipitation areas, and commercial farmers in these areas deal with them by spraying pesticides. However, most small farmers do not use pesticides, as they are quite expensive<sup>6</sup>. In addition, most small farmers do not have proper knowledge of pesticides<sup>7</sup>. In addition, some farmers claim that the capacity of the Tropical Pesticides Research Institute (TPRI), which is responsible for providing consent for pesticide usage, for testing and examining pesticides is poor, and it takes a long time for pesticides that are extensively used outside of Tanzania to be approved for use in the country. Thus, farmers may fail to deal with pests<sup>8</sup>.

Most small farmers apply organic fertilizer that is purchased from a shop or sourced from their own livestock to avocado trees. The supplies of fertilizers that are suitable for avocado trees are limited, especially for micronutrients, such as zinc<sup>9</sup>.

5.3.3. Production

(1) Overview of avocado production in Tanzania

Table 5-7 shows the annual production volumes of avocados by country in 2017. Tanzania

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<sup>2</sup> Based on interviews with the Ministry of Agriculture and avocado exporters.

<sup>3</sup> Based on an interview with the Research and Training Center, Uyole.

<sup>4</sup> Based on an interview with the Research and Training Center, Uyole, and the Tanzania Horticultural Association (TAHA).

<sup>5</sup> Rungwe Avocado Company sold seedlings of Hass avocados to their out-growers for the last five years, but it stopped doing so in 2019 because many out-growers did not pay for them.

<sup>6</sup> Based on interviews with the Ministry of Agriculture and the Research and Training Center, Uyole.

<sup>7</sup> Based on an interview with the Ministry of Agriculture.

<sup>8</sup> Based on interviews with Africado and avocado farmers in Rungwe.

<sup>9</sup> Based on an interview with the Ministry of Agriculture and exporters.

ranked eighth in the world in terms of avocado production volume in 2017 and is the second-largest producer in Africa after Kenya. As the global demand for avocados has been increasing, global avocado production increased by 35% between 2012 and 2017, and that of Tanzania increased by six times during this period<sup>10</sup>.

**Table 5-7: Annual production volumes of avocados by country (2017)**

Country	Production volume (tons)
Mexico	2,029,886
Dominican Republic	637,688
Peru	466,758
Indonesia	363,157
Colombia	314,275
Brazil	213,041
Kenya	194,279
<b>Tanzania</b>	<b>147,231</b>
Venezuela	133,922
Chile	133,636
USA	132,730
Guatemala	125,596
China	124,110
Israel	110,000
South Africa	62,840
<b>World</b>	<b>5,924,398</b>

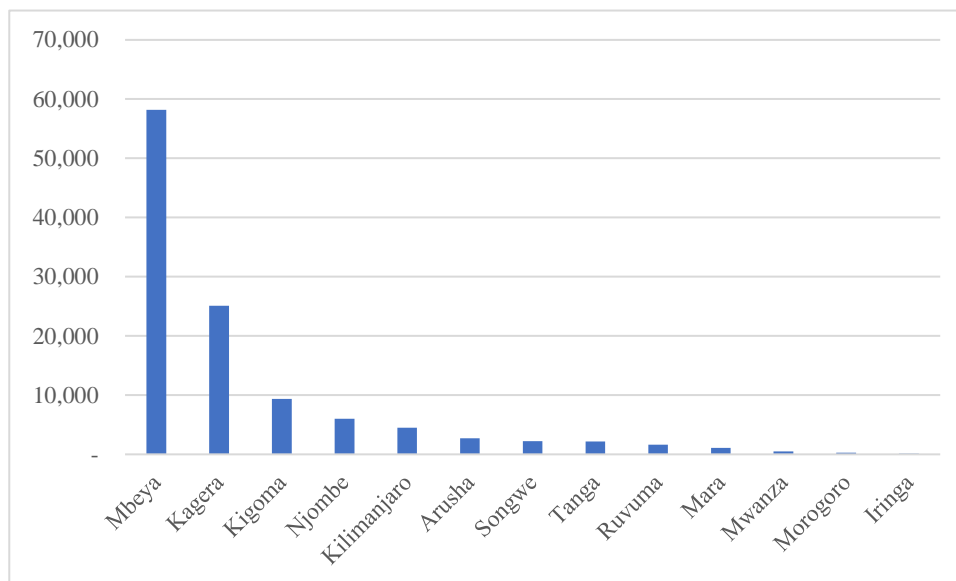
Source: FAOSTAT<sup>11</sup>

Most of Tanzania has a suitable climate for avocado planting (i.e., relatively cool temperatures and sufficient precipitation). As shown in Figure 5-9, the major avocado production sites are the Arusha and Kilimanjaro regions in the north; the Mbeya, Njombe, Iringa, and Songwe regions in the south; and the Kagera and Kigoma regions in the west. In the Arusha, Kilimanjaro, Mbeya, Njombe, and Songwe regions, many Hass avocados (which are exported) are planted, as some exporters are located in these regions. However, no exporters are located in the western regions of Tanzania, and, thus, most of the avocados produced in this area are consumed in the domestic market. Southwestern Tanzania has some areas that are suitable for avocado production, such as the Ruku and Kigoma regions, but avocado cultivation has not drawn attention in these areas thus far, and avocado production volumes are low in these areas<sup>12</sup>.

<sup>10</sup> According to the Avocado Market Profile of the Tanzania Trade Development Authority, Tanzania's avocado production volume in 2012 was 250,000 tons.

<sup>11</sup> The source for Tanzania's production volume is the Ministry of Agriculture.

<sup>12</sup> Based on an interview with the Ministry of Agriculture.



**Figure 5-9: Annual avocado production volumes by region (tons, 2018)**

Source: Ministry of Agriculture

## (2) Avocado producers

Most avocado farmers in Tanzania are small-scale farmers. These small farmers usually cultivate avocados with other fruits and do not have ties to exporters.

Some exporters own large avocado farms. Table 5-8 shows the major avocado exporters in Tanzania and their export volumes in 2019. As shown in the table, most of Tanzania's avocado exports are carried out by the three major exporters, Africado, Kuza Africa, and Rungwe Avocado Company. These exporters have their own avocado farms and have organized avocado farmers in groups as their out-growers to supply avocados for export.

Table 5-9 shows the scales of the farms and out-growers of Africado and Rungwe Avocado Company. As the table shows, these exporters rely on their out-growers to supply avocados for export. Most of these out-growers are small farmers who own less than one acre of land<sup>13</sup>. The limited supply of high-quality avocados (in terms of size, form, and color) for export is a major issue for Tanzania's avocado exporters. However, the production scales of out-growers are quite small, and their cultivation skills are low. It is quite difficult for exporters to procure their desired quantities of high-quality avocados<sup>14</sup>.

<sup>13</sup> Based on interviews with Rungwe Avocado Company and Africado.

<sup>14</sup> Based on interviews with Rungwe Avocado Company, Africado and Tanzarice.



**Table 5-8: Major avocado exporters in Tanzania and their export volumes in 2019**

Exporter	Location	Volume of exports (tons)
Africado	Kilimanjaro	2,500
Kuza Africa	Rungwe	2,000
Rungwe Avocado Company	Rungwe	1,400
Others (Tanzanice, Lima, etc.)	Iringa, etc.	400
Total		6,300

Source: Interviews with the Tanzania Trade Development Authority and Africado

**Table 5-9: Scales of Africado’s and Rungwe Avocado Company’s farms and out-growers (2019)**

Exporter	Own avocado farm area (ha)	Production volume at own farm (tons)	Number of out-growers	Quantity supplied by out-growers (tons)
Africado	137	2,300	2,000	200
Rungwe Avocado Company	60	1,200	5,000	800

Source: Interviews with Africado and Rungwe Avocado

However, some medium-scale avocado farmers plant more than ten acres in the Mbeya, Iringa, Njombe regions due to the USAID “Horticulture Opportunity Strengthen Initiative Project”<sup>15</sup>.

### (3) Avocado buyers and farm gate prices

As shown in Table 5-9, the annual quantity of avocado exports from Tanzania in 2019 was only 6,300 tons despite more than 100,000 tons of annual production. All exported avocados are Hass avocados. The Hass variety predominates in the world’s export markets because it has thick skin and, thus, is easy to deliver and because it is easy to determine when these avocados are good to eat because their skin color becomes black when they ripen. The Fuerte and Bacon varieties, which have soft skins, are also widely produced in Tanzania, but they are consumed in the domestic market rather than being exported.

The farm gate price of avocados in the domestic market is 600–800 TZS, which is about half of the price of exported avocados (1,000–1,500 TZS). The major buyers of avocados from farmers include the exporters in Tanzania listed in Table 5-8 and the many middlemen who sell to exporters in Kenya. As shown in Table 5-10, the farm gate price of avocados for export has been increasing in recent years, partly owing to competition with middlemen<sup>16</sup>.

<sup>15</sup> Based on interviews with TAHA and Africado.

<sup>16</sup> Based on interviews with Rungwe Avocado Company and Africado.

**Table 5-10: Trends in the avocado purchase price of Rungwe Avocado Company**

Year	Purchase price per kilogram (TZS)
2016	450
2017	600
2018	850
2019	1,300

Source: Rungwe Avocado

The unit price of avocados produced in Tanzania is lower than those of its competitors, such as Mexico, Peru, Chile, and Israel (Table 5-11). This difference is because the quality (size and form) and production costs of Tanzanian avocados are lower than those of the competitors. As evidence, Table 5-12 shows a comparison of the production and transportation costs of providing avocados to Europe across avocado-producing countries.

**Table 5-11: Volumes, values, and unit prices of avocados for export by country (2017)**

Country	Export volume (tons)	Value of exports (1,000 USD)	Unit price (USD/kg)
Mexico	896,557	2,901,063	3.24
Peru	247,363	581,229	2.35
Chile	177,236	479,290	2.70
USA	50,907	152,283	2.99
Kenya	51,507	78,020	1.51
Israel	33,419	69,373	2.08
<b>Tanzania</b>	<b>4,375</b>	<b>4,642</b>	<b>1.86</b>
<b>World</b>	<b>2,064,455</b>	<b>5,987,508</b>	<b>2.90</b>

Source: FAOSTAT

**Table 5-12: Total cost of producing and transporting avocados to Europe per kilogram (USD)**

Countries with summer harvests		Countries with winter harvests	
USA	2.62	Morocco	3.34
Mexico	2.19	Israel	3.26
Brazil	2.17	Spain	3.21
Peru	2.01	Chile	2.44
South Africa	1.31	Colombia	2.09
Kenya	1.94	Mexico	2.19
Tanzania	1.14	Dominica	1.72

Source: Market profiles of avocados, Tanzania

#### (4) Relation between exporters and out-growers

When exporters sell avocados to Europe, North America, or the Middle East, they are required by their buyers to obtain GLOBALG.A.P. certification. In response, many avocado exporters in Tanzania form farmers' groups among their out-growers and allow them to obtain GLOBALG.A.P certification as a group<sup>17</sup>. Because obtaining GLOBALG.A.P certification is very costly, it is difficult for small farmers to achieve. When exporters organize farmer groups, however, they bear all the costs of obtaining certificates.

To ensure that the avocados they procure are high-quality, exporters require their out-growers to plant only seedlings that they provide<sup>18</sup>. Exporters' purchasing prices from out-growers are predetermined in the case of Rungwe Avocado Company, but they are post-determined (after shipment to Europe) in the case of Africado<sup>19</sup>.

In many cases, exporters pay their out-growers two or three months after the avocados are delivered to the exporters. Some out-growers choose to sell their avocados to middlemen who pay at the time of delivery even though doing so is a breach of contract<sup>20</sup>. Out-growers' avocados are harvested by exporters<sup>21</sup>. In addition, most exporters hire cultivation experts and provide technical services to their out-growers.

#### (5) Formation of farmers' groups

Small avocado farmers organize themselves into farmers' groups in very few cases other than when where exporters organize their out-growers. The Survey Team's fieldwork identified two cases of the formation of avocado farmers' groups in the Mbeya region, as described in Table 5-13.

**Table 5-13: Avocado farmers' groups in the Mbeya region**

Names of farmers' groups	Records of their activities
Uwamaru	Utilize a pack house built by the District Council, grade and pack their avocados as a group, and sell them to an exporter <sup>22</sup> .
Uwamanbo	Make collective purchases of avocado seedlings as a group.

Source: The Survey Team

<sup>17</sup> Based on interviews with Rungwe Avocado Company and Africado.

<sup>18</sup> Based on interviews with Rungwe Avocado Company and Africado.

<sup>19</sup> However, some of the payment is made when the out-growers deliver their product.

<sup>20</sup> In the case of Africado, 60% of the avocados produced by their out-growers are purchased by other middlemen.

<sup>21</sup> In the case of East Africa Grower, the out-growers harvest and deliver avocados themselves.

<sup>22</sup> The pack house is currently used by Kuza, an avocado exporter.

#### (6) Major issues facing avocado production in Tanzania

The major issues facing avocado production in Tanzania are as follows.

- Because the competition among buyers to procure avocados from farmers is quite high, many avocados are harvested prematurely.
- Owing to low precipitation and inadequate irrigation facilities, avocado production is unstable in parts of the Mbeya region.
- As farmers' cultivation, harvest, and post-harvest management skills are low, many avocados are not of high enough quality for export even though they are Hass avocados.
- It is quite difficult for small farmers to obtain certificates for export, such as GLOBALG.A.P and Fair Trade certificates, as obtaining them is costly.
- Although there is demand for investments in avocado plantations and processing facilities, farmers and processors have difficulty acquiring loans from financial institutions.

#### 5.3.4. Processing

##### (1) Grading and packing

Avocados for export are delivered from farms to exporters' pack houses. As shown in Table 5-8, exporters are located only in some regions in the northern and southern areas of Tanzania; no exporters are located in other areas. Farmers in these areas therefore face difficulty selling avocados for export because pack houses with refrigerators are required for exporting avocados, and most of the avocados produced in these areas are consumed in the domestic market.

##### (2) Oil extraction

Tanzania has several small-scale avocado oil extractors, but it has no large-scale extractor. Some Tanzanian avocados are exported to oil extractors in Kenya<sup>23</sup>.

Because Tanzania has no large-scale avocado processing firm, it is difficult for farmers to sell avocados whose size, color, or form makes them unsuitable for eating fresh. Such avocados can only be used for self-consumption (including for livestock) and are otherwise wasted<sup>24</sup>.

Olivado, a firm located in the Njombe region, is currently building a large-scale avocado extracting plant<sup>25</sup>.

#### 5.3.5. Distribution

Fresh avocados for export should be delivered from out-growers to pack houses by reefer trucks, but they are delivered by ordinary trucks without refrigerators because the exporters do not have

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<sup>23</sup> Based on an interview with the Ministry of Agriculture.

<sup>24</sup> Based on an interview with the Ministry of Agriculture.

<sup>25</sup> Based on an interview with the Ministry of Agriculture.

reefer trucks. However, avocados that are packed at exporters’ pack houses are delivered to the ports via reefer trucks owned by transporting firms, such as TAHA Fresh. Then, these avocados are stored in refrigerators at the ports until they are shipped.

Most of Tanzania’s avocado exports are moved by container ships. The port of Dar es Salaam can be used for shipping fresh products, but the capacity of its refrigerating facilities is insufficient, meaning that loading fresh products takes a long time. Thus, shipping avocados to Europe from the Dar es Salaam port takes longer than shipping them from Kenya or South Africa. This extended shipping time leads to the deterioration of avocado quality<sup>26</sup> (Table 5-14). For this reason, Africado, which is located near the Kenyan border, ships avocados to Europe from Mombasa port.

**Table 5-14: Comparison of avocado transportation costs and time of delivery to Europe from several avocado production sites**

Country	Production site	Port of shipment	Cost of delivery within the country per container (USD)	Cost of shipment to Europe per container (USD)	Number of days to ship to Europe (door-to-door)
Kenya	Murange County	Mombasa	2,500	5,900	21
Tanzania	Kilimanjaro region	Mombasa	2,500	5,900	25-30
	Rungwe region	Dar es Salaam	7,000	6,000	25-30
Mexico, Chile	Unknown	Unknown	Unknown	3,000	Unknown
South Africa	Unknown	Unknown	Unknown	Unknown	21

Source: Based on interviews with Rungwe Avocado Company, Africado, and TAHA Fresh.

In addition, as the transportation costs from major avocado production sites in the southern part of Tanzania to Dar es Salaam port are quite high (see Table 5-14), Tanzania’s avocados are less cost competitive<sup>27</sup>.

A small volume of avocados is delivered to Europe by air from Kilimanjaro airport. However, as the cost of delivery by air is three times as high as that by sea, it is only feasible to deliver very high-quality avocados by air during the off-season<sup>28</sup>.

The Ministry of Works, Transport, and Communication plans to build refrigeration facilities in the Songwe airport. If these facilities are built, avocados can be exported to Europe from that airport. However, as described earlier, the delivery of avocados by air is only feasible in the off-season, and, thus, these facilities are not expected to affect exporters in southern regions<sup>29</sup>.

<sup>26</sup> Based on interviews with Rungwe Avocado Company, Africado, and TAHA Fresh.

<sup>27</sup> Based on an interview with Rungwe Avocado Company.

<sup>28</sup> Based on interviews with Rungwe Avocado Company and Africado.

<sup>29</sup> Based on interviews with Rungwe Avocado Company, Africado, and TAHA Fresh.

However, refrigerated facilities are not used for the distribution of avocados that are consumed domestically. Most of the avocados for domestic consumption are distributed by middlemen. After middlemen visit small farmers and purchase avocados, they harvest and grade the avocados. They then deliver them to exporters or wholesalers.

### 5.3.6. Imports, exports, and the domestic market

#### (1) Exports

As shown in Table 5-11 the value of avocado exports from Tanzania is still small, but it has increased significantly in recent years (Table 5-15). As Table 5-15 shows, European countries are the major destinations of Tanzanian avocados.

**Table 5-15: Value of avocado exports from Tanzania to various countries (1,000 USD)**

Country	2014	2015	2016	2017	2018
France	391	204	1,205	1,519	3,858
Netherlands	234	492	278	1,587	2,830
Great Britain	176	457	543	644	1,515
Belgium	88	135	0	0	66
Spain	0	0	0	62	62
Portugal	0	0	0	0	61
Kenya	10	5	24	600	57
Zambia	0	0	0	0	54
China	0	0	0	0	30
South Africa	0	0	0	117	21
Russia	0	0	0	0	17
UAE	0	0	6	17	6
Hong Kong	0	0	7	0	0
Italy	0	0	0	66	0
Lebanon	0	0	0	30	0
USA	0	0	22	0	0
<b>Total</b>	<b>899</b>	<b>1,293</b>	<b>2,085</b>	<b>4,642</b>	<b>8,577</b>

Source: Tanzania Trade Development Authority.

There is no specific regulation for exporting avocados from Tanzania. However, the following documents must be submitted to customs for each consignment, and checks by the issuing authorities are required to obtain these documents.

- Export certificate (Photo-sanitary Certification) issued by the Plant Health Service of the Ministry of Agriculture. Tanzania is a member of the International Plant Protection Convention, and a plant quarantine is conducted based on the International Standards For

Phytosanitary Measure. In addition, an import permit at the destination country is required for quarantine checks.

- Export certificate issued by the Tanzania Bureau of Standards (TBS): A pesticide residue test is required to obtain this certificate.

Exports of Tanzanian avocados to China and Japan are not approved owing to the risk of contamination from European flies. According to the Ministry of Agriculture and the Tanzania Trade Development Authority (TanTrade), Tanzania has not tried to explore the Chinese and Japanese markets. Yet many avocado exporters desire to explore new markets and expect the government to start initiatives to lift the bans on exporting avocados to such countries as China and Japan<sup>30</sup>.

## (2) Domestic market

All avocado varieties except for Hass avocados are consumed in the domestic market. The retail price of an avocado at Kisutu Market in Dar es Salaam is 3,000 TZS (November 2019), which is quite expensive compared to other fruits and vegetables. However, the demand for avocados in Tanzania has been increasing<sup>31</sup>.

### 5.3.7. Policies and the role of the government

#### (1) Policies

The Tanzanian Horticultural Development Strategy 2012–2021 was formulated in 2010, and it targets tenfold increases in the production volumes and exports of horticultural products during the target period to benefit small farmers. Avocados are considered a major horticulture product, and the government has made substantial effort to promote them, as they have become one of the more popular cash crops among Tanzanian farmers<sup>32</sup>.

#### (2) Ministry of Agriculture

The major role of the Ministry of Agriculture in the avocado VC is the provision of technical support by extension workers. Usually, each district has one district office of the Ministry, and at least one agricultural district officer and one extension officer are stationed in a district office.

In addition, the following two research and training centers of the Ministry of Agriculture provide farmers with technical support for avocado cultivation.

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<sup>30</sup> Based on interviews with Rungwe Avocado Company, Africado, and Tanzarice and discussions at the workshop.

<sup>31</sup> Based on interviews at Kisutu market and with the Ministry of Agriculture.

<sup>32</sup> Based on interviews with the Ministry of Agriculture and TanTrade.

- Horticulture Research and Training Institute in Arusha (Horti Tengeru)
- Research Institute in Uyole, Mbeya

The Research Institute in Uyole provides neighboring farmers with the training and necessary equipment for grafting and cultivation. Some of the trained farmers have begun to operate avocado nurseries in the Mbeya region.

### (3) TanTrade

The major role of TanTrade is promoting Tanzanian products, including agricultural products, in international markets. For this purpose, they conduct various types of market research, provide trainings to producers and processors, organize exhibitions in Tanzania, and participate in exhibitions in other countries.

To support the avocado VC, they have worked with TATA to train farmers on fruit plantations and send avocado exporters to exhibitions in other countries.

### (4) TAHA

TAHA is an association of horticulture producers and processors, and it has 705 members. It implemented the Horticulture Opportunity Strengthen Initiative project, which is sponsored by USAID and sends two agricultural experts to the Njombe region to provide technical support to avocado farmers.

In addition, TATA Fresh, an affiliated company of TAHA, runs a nursery of avocado trees in the Kilimanjaro region and sells about 300 avocado seedlings per year.

TAHA is also considering developing an agricultural certification for Tanzanian farmers (i.e., TAHA Cert) that can be obtained more easily and at a lower cost than that of international certificates, such as GLOBALG.A.P.

## 5.3.8. Issues and opportunities

Table 5-16 shows the SWOT analysis of the avocado VC in Tanzania.

### (1) Issues

The major issues facing the avocado VC as a whole include limited access to credit for investors in farming, exports, and processing; limited access and usage of quality fertilizers and pesticides; and a limited number of avocado processing firms.

The major issues facing small farmers and out-growers are limited access to quality seedlings for farmers, pack houses with cold storage, and irrigation as well as poor harvest and post-harvest management owing to a lack of skills and competition between buyers.

The major issues facing exporters are logistics problems (i.e., the port of Dar es Salaam and



domestic transportation), which lead to high costs and quality issues; difficulty procuring high-quality avocados from small farmers; and competition with Kenyan buyers to procure avocados. Furthermore, although Tanzania has the potential to explore new markets, such as China and Japan, exporters lack the quarantine treatment capacities needed to export avocados to these countries.

In addition, increasing competition in international markets is a big threat.

(2) Opportunities

Opportunities in the avocado VC include a suitable climate for avocado production, the availability of vast land area that can be used for avocado tree plantations, and several exporters that have links to international markets. In addition, there is an opportunity to explore new markets, such as China and Japan. Furthermore, although Tanzania currently has few avocado processing activities, they may be expanded in the future.

**Table 5-16: SWOT analysis of the avocado VC in Tanzania**

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>● Climate is suitable for avocado production.</li> <li>● Vast lands can be used for avocado tree plantations.</li> <li>● Pests and diseases are not serious problems (i.e., organic production is not difficult).</li> <li>● Several exporters have cold chains and links to foreign customers.</li> </ul>	<p><b>Weaknesses</b></p> <p>Overall</p> <ul style="list-style-type: none"> <li>● Tanzanian avocados are not a strong brand in international markets owing to low quality.</li> <li>● Initiative to explore new markets (such as China and Japan) is limited.</li> <li>● Investors have limited access to credit for farming, exports, and processing.</li> <li>● Access to and use of quality fertilizers and pesticides are limited.</li> <li>● The number of avocado processing firms is small.</li> </ul> <p>For small farmers/out-growers</p> <ul style="list-style-type: none"> <li>● The scale of production is very small.</li> <li>● Farmers have limited access to quality seedlings.</li> <li>● Farmers have limited access to pack houses with cold storage.</li> <li>● Harvest and post-harvest management is poor owing to a lack of skills and buyer competition.</li> <li>● Irrigation facilities are lacking (in some areas).</li> </ul> <p>For exporters/commercial farmers</p> <ul style="list-style-type: none"> <li>● Logistics problems (i.e., the port of Dar es Salaam and domestic transportation) lead to high costs and quality issues.</li> <li>● Procuring high-quality avocados from small farmers is difficult.</li> <li>● Kenyan buyers compete to procure avocados.</li> <li>● Quarantine treatment capacity is lacking.</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>● International demand is increasing.</li> <li>● East Asian markets (e.g., China and Japan) offer potential.</li> <li>● Processing avocados into oil offers potential additional value.</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>● Competition may increase in international markets.</li> </ul>

Source: The Survey Team

## 5.4. Macadamia nut VC

### 5.4.1. Overview

Figure 5-10 shows an overview of the macadamia nut VC. Macadamia nuts are not popular in Tanzania. Their production, domestic market, and exports are all small-scale. Cultivated varieties were first introduced several decades ago and were recently introduced from Kenya. The yield of macadamia nuts is low, as they are extensively cultivated without fertilization or the application of agro-chemicals. The high demand for macadamia nuts and their high price in the global market attract commercial farmers who produce other tree crops. Table 5-17 shows macadamia nut prices at each stage of the VC.

**Table 5-17: Macadamia nut prices in Tanzania**

Farm gate price	15 – 18 USD/kg of shelled nuts (price in Kenya)	1,650 - 1,980 JPY/kg	(1 USD = 110 JPY)
	3,000 TZS/kg of in-shell undried nuts (produced in Tanzania)	144	JPY/kg (1 TZS = 0.048 JPY)
Domestic retail price	25 USD/kg of shelled nuts (produced in Kenya)	2,750	JPY/kg (1 USD = 110 JPY)
	21,000 TZS/100g of shelled, roasted, and salted nuts (imported from Dubai)	10,080	JPY/kg (1 TZS = 0.048 JPY)
	5,000 TZS/250g of shelled and vacuum packed nuts (produced and processed at own farm)	960	JPY/kg (1 TZS = 0.048 JPY)
Export price	24 USD/kg of shelled nuts for export to China (produced in Kenya)	2,640	JPY/kg (1 USD = 110 JPY)
Retail price in export destination (Germany)	5.99 EUR/125g (origin is unknown. Price at Seeberger GmbH)	5,863	JPY/kg (1 EUR = 122.4 JPY)

Source: The Survey Team



**Figure 5-10 Overview of Tanzania’s macadamia nut VC**

Source: The Survey Team

#### 5.4.2. Agricultural inputs

##### (1) Seedlings

It is presumed that macadamia trees were introduced to Tanzania several decades ago. The mother trees of the varieties that were introduced at the time still exist at TARI Tengeru<sup>33</sup> and Sokoine University of Agriculture (SUA). However, the proper variety names of the mother trees are unknown in both locations. Some private nurseries sell several varieties of macadamia seedlings, but they do not know the proper names of the varieties<sup>34</sup>. Kenya is the third-largest producer of macadamia nuts, and its most popular macadamia nut variety is the MURANGA 20 variety, which was discovered by the JICA technical cooperation project in the 1980s.

Seedlings are produced and sold by private nurseries and macadamia farmers, and their prices are shown in Table 5-18. TARI and SUA do not produce seedlings, although they do have mother trees.

**Table 5-18: Prices of macadamia seedlings**

Seller	Variety	Price (TZS/seedling)
Lima Kwanza Tanzania Ltd.	H2, H4, H625, and AMETHEN 50	7,500
Black Future Charity Missionary (NGO)	Unknown (original seedling was introduced by a farmer in Rungwe)	7,000
Mrs. Polepole (Macadamia farmer)	Unknown (obtained from the JICA project in the 1980s)	5,000

Source: The Survey Team

##### (2) Fertilizers and agro-chemicals

Macadamia farmers essentially do not apply fertilizer or agro-chemicals other than the application of organic fertilizer when transplanting seedlings. Sakarani Farm in the Lushoto district applies lime every other year, but it is an exceptional case.

#### 5.4.3. Production

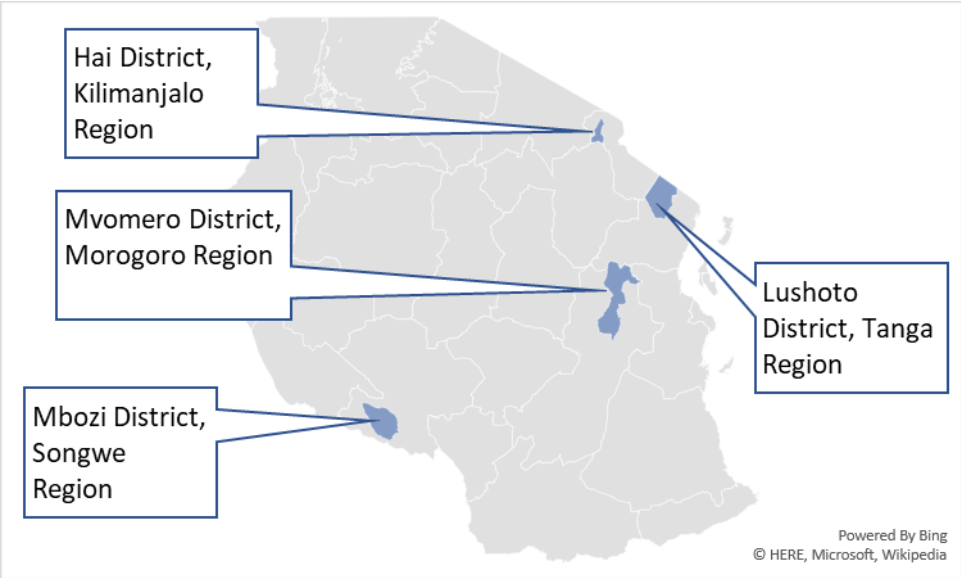
##### (1) Production area

In recent years, commercial tree crop farmers in Tanzania have begun to plant macadamia trees, attracted by the high demand for and price of macadamia nuts in the global market. Macadamia nuts are less popular than other tree crops, such as coffee, avocados, and so on, in Tanzania, and they are not well researched even among agricultural government organizations, including the

<sup>33</sup> They mentioned that no one at the institute knows about the introduction of macadamia trees, as it took place a long time ago. TARI Tengeru has named the seven varieties at the institute Tengeru MC1, Tengeru MC2, Tengeru MC 3, Tengeru MC4, Tengeru MC5, Tengeru MC6, AND Tengeru MC7 for convenience.

<sup>34</sup> Lima Kwanza Tanzania Ltd. produces and sells seedlings of macadamia varieties called H2, H4, H625, and AMETHEN 50.

Ministry of Agriculture, TARI, and SUA. Statistics about macadamia nuts, such as production volumes and the area under cultivation, are not available. The Survey Team did confirm the locations in which macadamia nuts are cultivated, as shown in Figure 5-11.



**Figure 5-11: Macadamia nut production locations in Tanzania, as identified by the Survey Team**

Source: The Survey Team

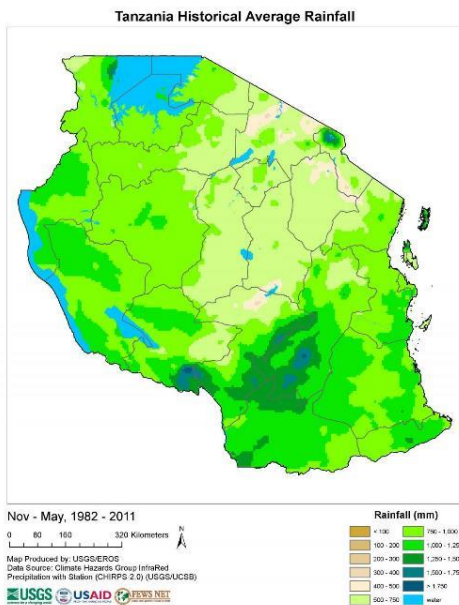
The suitable climate and soil type for macadamia nut cultivation are described in Table 5-19.

**Table 5-19: Suitable climate and soil type for macadamia nut cultivation**

Soil	pH level around 5 – 6.5 and well draining
Temperature	Not below 10 °C and optimum 25 °C
Rainfall	1,000–2,000 mm/year

Source: The Survey Team

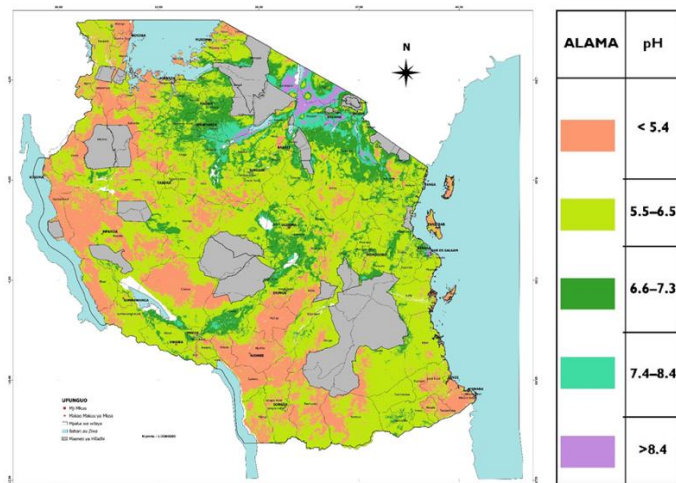
Tanzania’s annual rainfall, soil pH, and climate classification are shown in Figure 5-12, Figure 5-13 and Figure 5-14 respectively. Referring to these figures and Table 5-19, all of Tanzania except for the arid area in central Tanzania is suitable for macadamia cultivation. Macadamia trees can be grown in areas with as much rainfall as 1,000 mm/year, but it lowers the yield. Very high temperatures affect both growth and yield, as macadamia trees originated in Queensland, Australia, which has a subtropical climate. A macadamia tree farmer located in a suburb of Dar es Salaam produces 25 kg of shelled nuts per tree. This yield is much lower than the average yield in Australia of 73 kg per tree.



**Figure 5-12 Annual rainfall in Tanzania**

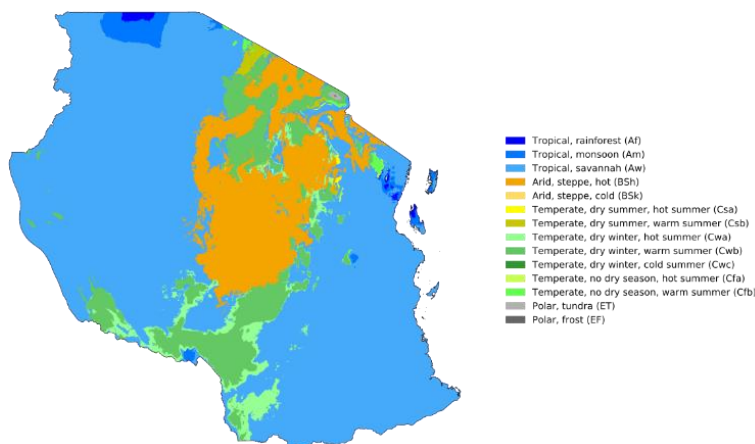
Source: United States Geological Survey (USGS)

Köppen-Geiger climate classification map for Tanzania (1980-2016)



**Figure 5-13 Soil pH levels in Tanzania**

Source: TARI



Source: Beck et al.: Present and future Köppen-Geiger climate classification maps at 1-km resolution, *Scientific Data* 5:180214, doi:10.1038/sdata.2018.214 (2018)

**Figure 5-14 Climate classifications in Tanzania**

Source: "Present and future Köppen-Geiger climate classification maps at 1-km resolution". *Nature Scientific Data*.

(2) GLOBALG.A.P. and MRLs of European countries .

The volume of exported macadamia nuts from Tanzania remains small, and their destinations are Europe and Asia. Sakarani Farm in the Lushoto district exports dried and vacuum-packed macadamia nuts to Germany, and its customer does not require the farm to obtain GLOBALG.A.P. certification. The farm does not use agro-chemicals and or chemical fertilizers; it only uses lime every other year to fertilize the soil. Thus, the product complies with the German Maximum Residue Level (MRL).

Macadamia tree farmers in Tanzania do not typically obtain GLOBALG.A.P. certification or organic certificates. However, they may be asked by importers in European countries to do so in

the future.

#### 5.4.4. Processing

Ripe and dropped macadamia nuts are harvested, husked, and sun-dried in their shells until space is created between the shells and the shrunken kernels. The dried nuts are shelled using simple machines, and the kernels are dried again. The temperature is controlled by a stove or boiler to appropriately dry the kernel occasionally. The dried kernels are then vacuum-packed for export. Apart from Sakarani Farm, some companies export dried macadamia nuts in their shells to macadamia nut-exporting countries, such as Kenya and South Africa, and Asian countries, including Thailand, Vietnam, China, and Taiwan.

Sakarani Farm extracts oil from substandard macadamia nuts and sells and exports the oil at a price of 20,000 TZS/L.

#### 5.4.5. Distribution

##### (1) Logistics

The transportation of macadamia nuts is simple. They do not require a cold chain, nuts in shells can be stuffed into a jute bag rather than transported in a crate or carton box, and road conditions do not affect the quality of the nuts. In short, macadamia nuts can be delivered anywhere that motorable roads and means of transportation are available.

##### (2) Packing

Shelled nuts should be properly packed using a vacuum-packing system, and vacuum-packing machines made in Germany or China are available in Tanzania. As mentioned above, no proper packing is necessary for the nuts in-shells.

#### 5.4.6. Imports, exports, and the domestic market

##### (1) Exports of macadamia nuts from Tanzania

The volume of exported macadamia nuts is shown in Table 5-20. Excluding the exceptionally high volume in 2018, the export volume has trended upward to around 800 tons per year. The exported macadamia nuts from Tanzania include transit trade from Kenya to Asia. In Kenya, exporting macadamia nuts in shells has been banned, but Tanzania can export such nuts<sup>35</sup>. If a customer of a Kenyan exporter of macadamia nuts wants nuts in shells, the products are often exported through Tanzania (see Box 5.1).

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<sup>35</sup> Adding value to agro-products is one of Kenya's major policies, and, thus, agro-products processed to a low degree are not permitted to be exported.

**Table 5-20: Volume of macadamia nuts whose export permits were granted as of November 2019**

Year	2017	2018	2019
Amount (tons)	781	3,986	842
Destination	Thailand, India, Turkey, Netherlands		

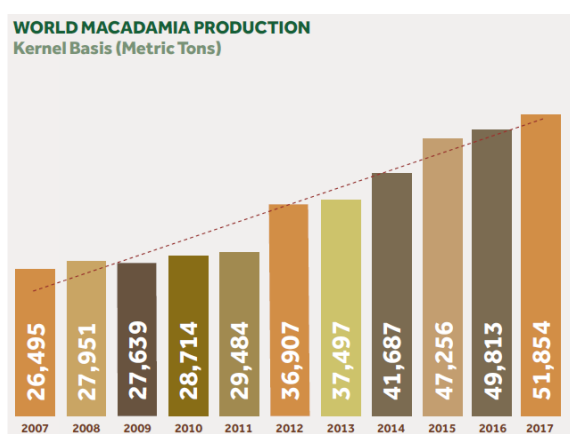
Source: National Food Security Division, Ministry of Agriculture, Tanzania.

**Box 5.1: Transit trading of macadamia nuts through Tanzania**

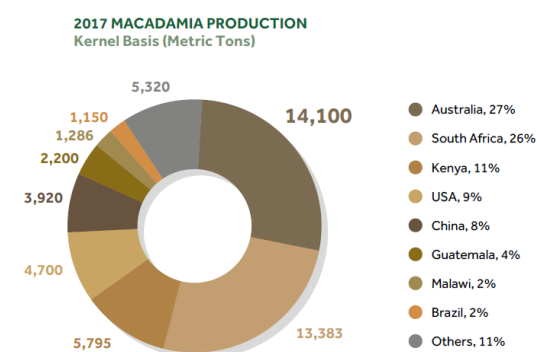
Imports and exports are very active in Tanga, a city located near the border with Kenya and facing the Indian Ocean. Boss Enterprise has its headquarters in Tanga and engages in transit exports of macadamia nuts. The company imports in-shell macadamia nuts from Mombasa, Kenya, and exports them to third countries, such as Vietnam, Thailand, and China. These countries want to import in-shell macadamia nuts because they have better processing technology for macadamia nuts and the empty shells are in high demand for making printed plywood. In 2018, 97 and 20 containers<sup>36</sup> of macadamia nuts were exported to Vietnam and Thailand, respectively. The diameters of the nuts range from 16 mm to 24 mm, and the nuts are not graded according to their size. The cost of exporting nuts is 1,400 USD per container, including 69,000 TZS for quarantine inspection. Inspection can be applied for online, and a phytosanitary certificate is issued in five minutes if the documents are prepared. Boss Enterprise recognizes the high global demand of macadamia nuts and intends to procure Tanzanian macadamia nuts for export.

(2) Global market for macadamia nuts

As Figure 5-15 shows, the production volume of macadamia nuts is increasing. In particular, it increased remarkably after 2012. Figure 5-16 shows the major macadamia nut-producing countries, and the top three countries are Australia, South Africa, and Kenya. Including Malawi, which is the seventh-largest macadamia-producing country, African countries account for three of the top eight countries.



**Figure 5-15: Global production volume of macadamia nuts (tons)**



**Figure 5-16: Share of macadamia nut production among the top eight countries in 2017**

Source: Nuts and Dried Fruits Statistical YearBook 2017/2018, International Nut and Dried Fruit Council (INC)

<sup>36</sup> A container is 40 feet long and contains 27 tons of nuts.



Growth in exported macadamia nuts was stagnant after 2012, as shown in Figure 5-17, but exports have trended upward in the long run. Figure 5-18 shows the major macadamia nut-exporting countries, and the top three countries are the same as the top three producing countries, namely, Australia, South Africa, and Kenya. Including Malawi, which is the eighth-largest exporter of macadamia nuts, African countries account for three of the top eight countries. Notably, the top eight countries include processing countries (e.g., China) and transit countries (e.g., Germany and the Netherlands).

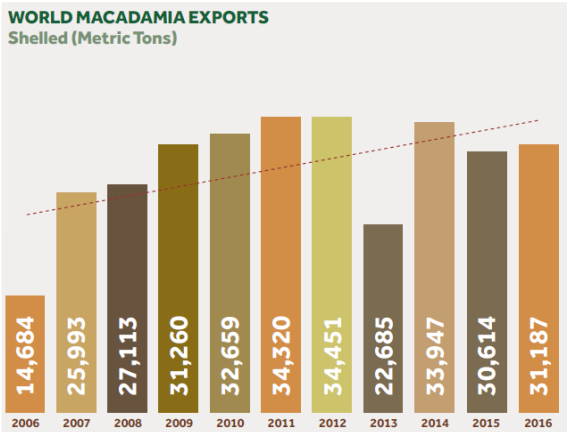


Figure 5-17: Volume of macadamia nut exports (tons)

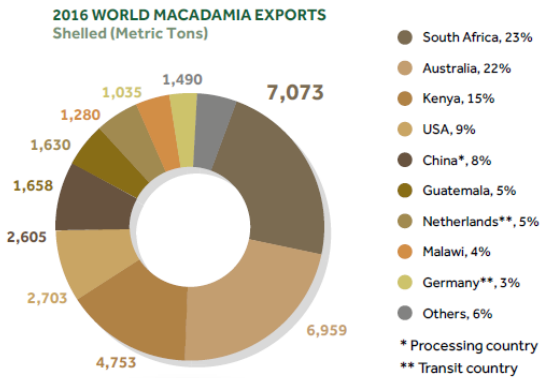


Figure 5-18: Share of macadamia nut exports among the top nine countries in 2017

Source: Nuts and Dried Fruits Statistical Year Book 2017/2018, INC

The fluctuation in the volumes of imported macadamia nuts for the top eight countries is shown in Figure 5-19, and the figure indicates many ups and downs. Figure 5-20 shows the shares of the top eight macadamia nut-importing countries, and these eight countries account for about 44% of the total share. This fact indicates that many countries import macadamia nuts, whereas only a few countries engage in producing and exporting macadamia nuts, as shown in Figure 5-16 and Figure 5-18.

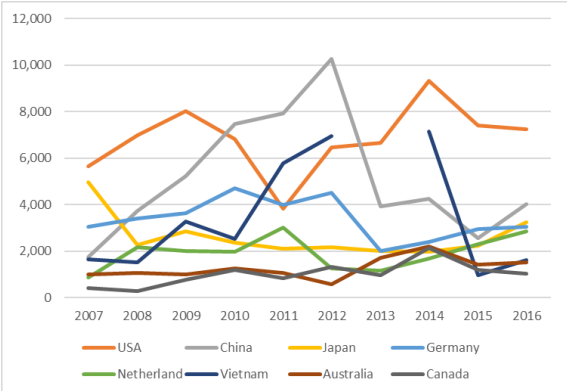


Figure 5-19: Volume of macadamia nuts imported by the top eight countries (tons)

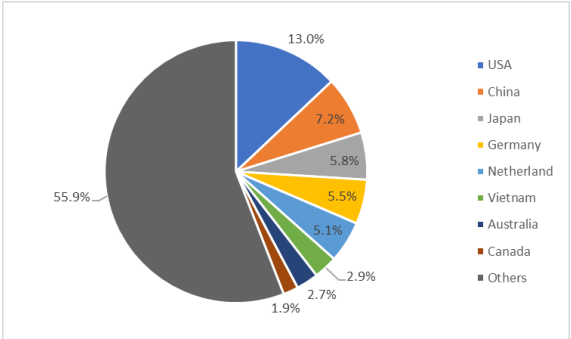


Figure 5-20: Share of macadamia nut imports among the top eight countries in 2017 (%)

Source: Nuts and Dried Fruits Statistical Yearbook 2017/2018, INC

### (3) Domestic market

Macadamia nuts are sold in very few places in Tanzania. Specifically, the Survey Team could confirm that only two shops<sup>37</sup> in Tanzania sold macadamia nuts. These nuts are imported from Dubai, and the annual sales amount at each shop is around 50 kg per year. No macadamia nuts are seen on store shelves in the Kariakoo market, which is one of the largest traditional markets in Dar es Salaam, but a middleman looked for customers by showing some samples. As shown in Table 5-21, some other sellers are found in Tanzania, such as a farmer selling macadamia nuts that she produces and a health-food dealer selling macadamia nuts imported from Kenya.

**Table 5-21: Retail prices of macadamia nuts in Tanzania**

Seller location	Supplier	Price (TZS)
i) Village supermarket, Dar es Salaam	Dubai	21,000/100 grams of shelled nuts
ii) Shopper Plaza at Masaki, Dar es Salaam	Dubai	17,800/100 grams of shelled nuts
iii) Kariakoo market, Dar es Salaam	Tanga district	6,000/kilogram of in-shell nuts
iv) Sakarani Farm, Lushoto district	Own farm	5,000/500 grams of shelled nuts
v) Joel Samson Ruvugo Traders, Dar es Salaam	Kenya	25 USD/kilogram of shelled nuts

Source: The Survey Team

#### 5.4.7. Policies and the role of the government

The Tanzanian government's existing agricultural policy is the ASDP II 2018–2030. The ASDP II sets the following four strategic areas.

- 1: Sustainable water and land use management (*crops, livestock, and fisheries*)
- 2: Enhanced agricultural productivity and profitability
- 3: Rural commercialization and value addition
- 4: Strengthening sector enablers and coordination

The promotion of the production and export of macadamia nuts complies with strategic areas 2 and 3. However, macadamia nuts are not mentioned in ASDP II and are not included as one of the prioritized crops. Macadamia nuts are not popular within the MoA, but it has taken notice of the private sector.

#### 5.4.8. Issues and opportunities

##### (1) Issues

Table 5-22 shows the results of the SWOT analysis of the macadamia nut VC. The primary weakness is the underdeveloped macadamia nut industry in Tanzania, as the production and export volumes remain small. Macadamia tree farms are expanding, but the seedling varieties are unknown, and yields remain low because cultivation knowledge is poor. Information on production and marketing is not well shared among the government, exporters, and farmers, meaning that exporters

<sup>37</sup> These stores are supermarkets targeting high-end consumers located in the Masaki area of Dar es Salaam.

and farmers must try to find each other.

The threats facing the VC are the strict quality control demanded by the global market and severe competition with other African countries.

(2) Opportunities

The strengths of macadamia nuts include relatively easy cultivation management and no need for a cold chain for transportation, which gives developing countries a comparative advantage in the production of macadamia nuts. A macadamia tree continues to bear fruit for over 100 years, and the price of macadamia nuts is the highest among all kinds of nuts. These facts imply that macadamia nuts can be a valuable asset for farmers. Tanzania has a few strengths relative to other countries. A large portion of Tanzania’s national land is suitable for macadamia cultivation, and Tanzania is 1.6 and 5 times larger than Kenya and Malawi, respectively. Finally, unlike Kenya, Tanzania can export macadamia nuts in- shells.

The opportunities of the VC are growing the global market and the existence of customers who buy the products even without GLOBALG.A.P. certification.

**Table 5-22: Result of the SWOT analysis of the macadamia nut VC in Tanzania**

<p><b>Strengths</b> (comparative strengths against other crops)</p> <ul style="list-style-type: none"> <li>● Easy to manage (less damage from pests and disease)</li> <li>● Bears fruit for over 100 years</li> <li>● No need for a cold chain</li> <li>● Highest price among all kinds of nuts</li> </ul> <p>(Tanzania’s strengths of macadamia nuts)</p> <ul style="list-style-type: none"> <li>● Vast available land for cultivation</li> <li>● Favorable climate and soil conditions for producing macadamia nuts</li> <li>● Tax exemption under the Economic Partnership Agreement with the EU.</li> <li>● Possible to export kernels in-shells which is banned in Kenya, and customers in Vietnam, China, and Thailand are identified.</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>● Small total production quantity</li> <li>● Small number of farmers and exporters</li> <li>● Low yield (variety &amp; tree management)</li> <li>● Small orchards</li> <li>● Insufficient supply of quality and grafted seedlings</li> <li>● Limited information about varieties and unknown varieties</li> <li>● Unavailability of locally fabricated De-shelling machines</li> <li>● Insufficient knowledge of tree management among farmers and extension officers</li> <li>● Insufficient market information among farmers and exporters</li> <li>● Insufficient networking among stakeholders</li> <li>● Insufficient capacity of commercial farmers to obtain GLOBALG.A.P. certificates</li> <li>● Low awareness and underdeveloped domestic market</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>● Growing international demand for kernels with and without shells</li> <li>● Small-scale Japanese nut dealers looking for unique organic macadamia nuts even without GLOBALG.A.P. certificates.</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>● High quality control is requested in the global market (condition, size, and so on)</li> <li>● Strong competitors in Africa, Kenya, Malawi, south Africa, and so on</li> </ul>

Source: The Survey Team

### 5.5. A Large-Scale Agricultural Investment Project in Tanzania

This session provides the progress of the Tanzania’s Southern Agricultural Growth Corridor of Tanzania (SAGCOT) project as an example of the large-scale agricultural investment project in Tanzania. The SAGCOT project was launched at the World Economic Forum held in Dar es Salaam in 2010 as a PPP that aims to boost agricultural productivity in Tanzania and the wider region by promoting “clusters” of profitable agricultural farming and service businesses, with major benefits for smallholder farmers and local communities. By catalyzing large volumes of responsible private investment, the initiative aims to deliver rapid and sustainable agricultural growth, thereby tackling food insecurity, poverty, and vulnerability to climate change<sup>38</sup>. The expected outcomes by 2030 are 350,000 hectares in profitable production serving regional and international markets, at least 420,000 new employment opportunities in the agricultural value chain, and annual farming revenues of 1.2 billion USD. In this way, the SAGCOT project is one of the most well-known PPP projects for large-scale agricultural investment in Tanzania and, thus, several mission teams from Japan’s Ministry of Agriculture, Forestry, and Fisheries and JICA have interviewed SAGCOT personnel so far (see Figure 5-21 for a schematic plan of SAGCOT by 2030 and the “Investment Blueprint” for more details on the original plan).

The SAGCOT project was initially conceived as a venture capital fund designed to finance the early growth and expansion stages of high-risk small and medium enterprises with out-grower or contract farming arrangements. World Bank involvement turned the investment component into a matching grant fund (MGF) scheme in which investors were reimbursed for their capital outlays, and the government signed a financial agreement with the bank in 2016<sup>39</sup>.

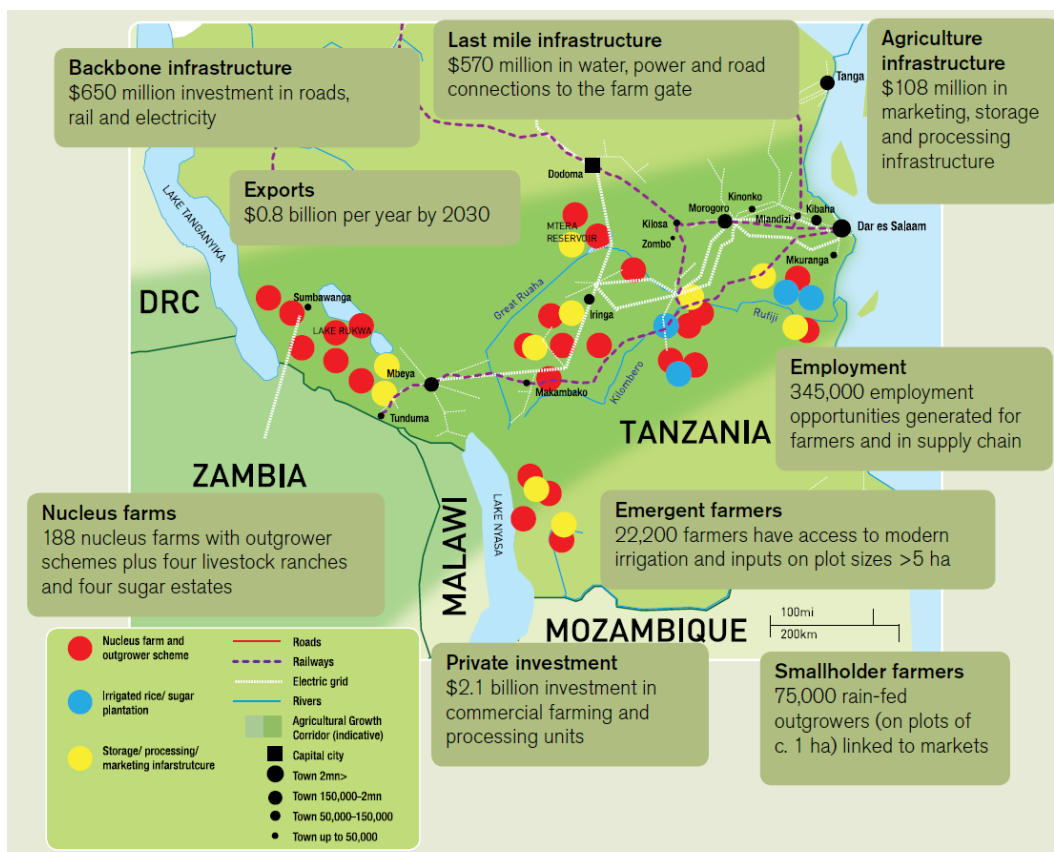
However, according to SAGCOT, as of July 2019, the planned 47 million USD MGF from the World Bank was canceled at the request of the Government of Tanzania, affecting hundreds of small-scale farmers who were expecting this funding. The MGF was supposed to be implemented under the second component of the SAGCOT project, called “Strengthening Smallholder Business Linkage.” The CEO of the SAGCOT Catalyst Trust Fund said that the investment project was cancelled owing to non-performance and that there was too much paperwork and audit sensitizing that took almost three and a half years<sup>40</sup>. Cancelling the investment program does not mean the end of the SAGCOT project, but an additional sponsor has not yet been identified (as of November 2019).

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<sup>38</sup> Tanzania Investment Centre (TIC) (2016) Investment Guide to Tanzania

<sup>39</sup> Africa Confidential (2019): [https://www.africa-confidential.com/article/id/12602/Farming\\_gamble\\_fails](https://www.africa-confidential.com/article/id/12602/Farming_gamble_fails)

<sup>40</sup> SAGCOT (2019): <https://sagcotctf.co.tz/2019/07/19/tanzania-government-cancels-sh100bn-sagcot-scheme/>



**Figure 5-21: Schematic plan of the SAGCOT project by 2030**

Source: SAGCOT (2011) SAGCOT Investment Blueprint

## 5.6. Assistance by development partners (DPs) in the value chains of sesame, avocados, and macadamia nuts

Except for USAID and the Netherlands Embassy, the DPs do not implement programs or projects that include sesame, avocados, or macadamia nuts in Tanzania. Thus, the ongoing and recently implemented programs and projects to support the agriculture VC are as follows.

### (1) USAID (avocados)

As part of Feed the Future Tanzania Mboga na Matunda (FTMM, January 2017 to January 2021), USAID has provided technical cooperation with avocado production manuals for 50,000 smallholder farmers in the SAGCOT area. With a budget of 20,000,000 USD, FTMM collaborates with the Tanzania Horticultural Association, SAGCOT, and Lima Kwanza, an NGO. Lima Kwanza organizes GLOBALG.A.P. training for avocado production and supports farmers in their exports. In addition, FTMM provides access to land, financial services, and market information. By 2017, 97% of the participants (23,198 farmers) in the training applied the new techniques and

increased production by up to 33%<sup>41</sup>. However, USAID recognizes the quality issues of the products.

(2) Netherlands Embassy (avocados)

The Netherlands Embassy has been active in supporting PPPs in Tanzania's agriculture sector. It has contributed to the increasing horticulture production, especially avocados, in the Arusha region of Kilimanjaro. The Embassy supports the entire Tanzanian avocado VC. It assists in the production of agricultural inputs, such as new varieties of seeds and seedlings, in collaboration with the Tengeru Community Development Research Institute in the Arusha region. The Embassy enhances the human resources capacities of private sector players, such as TAHA and SAGCOT. For processing, the Embassy collaborates with private companies in the Netherlands to provide storage facilities and support exports to EU countries. As a result of this assistance, Tanzania accounts for 30% of the Netherlands' avocado imports. As a destination of exported avocados from Tanzania, the Netherlands comes second to the United States.

However, the Embassy has pointed out the following issues in the avocado VC, and the government of the Netherlands plays a role in the modernization of production; capacity enhancement; a combination of assistance schemes, such as technical cooperation and grant/loan programs; and collaboration in establishing related policies and regulations.

- ① Higher taxes for exports
- ② Underdevelopment of logistics, ports for transportation, and processing machines
- ③ Low processing capacity at the farmer level

(3) EU (VC cooperation)

The EU does not implement programs or projects that target soybeans, avocados, or macadamia nuts. With financial support from the Aga Kahn Foundation, the EU implemented the Horticultural VC Development Project targeting tomatoes, onions, and leafy vegetables in the Lindy and Mutwara regions (2014 to 2018). As of November 2019, the EU planned to implement Agri Connect starting in 2020 to develop access roads between farmers and markets and improve the VCs of coffee, tea, and horticulture in the southern highlands and on Zanzibar.

(4) IFAD (VC cooperation)

IFAD does not implement programs or projects that target soybeans, avocados, or macadamia nuts. Through the Rural Micro, Small and Medium Enterprise Support Programme (2006 to 2017), it supported entrepreneurs' and farmers' income generation (such as organizing GLOBAL G.

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<sup>41</sup> Source: Feed the Future Fact Sheet (USAID)

A.P.training), targeting beans, tomatoes, maize, sunflowers, and livestock, by collaborating with the Small Industries Development Organization. The target area was nationwide.

(5) FAO (VC cooperation)

The FAO does not implement programs or projects that target soybeans, avocados, or macadamia nuts. It supports the VCs of sunflowers, poultry, horticulture crops, beans, cassava, and maize in the coastal area, that is, the Dodoma and Kigoma regions, in the framework of the UN Joint Programme to Support Sustainable Agriculture Value Chain Development. The FAO also provides technical cooperation for post-harvest rice with the financial support of the EU.

(6) WFP (VC cooperation)

Although the WFP does not implement programs or projects that target soybeans, avocados, or macadamia nuts, it has carried out the Value Chain Development Project nationwide since 2017. The WFP organizes trainings in production skills and marketing for smallholder farmers. As part of the project, the WFP provides bags with small cooling devices to farmers, builds cold storage, and promotes GLOBAL G.A.P. to improve the quality of produce. In 2017, the WFP began supporting startups in the agriculture sector.

The following organizations implement VC programs or projects with support from development partners. These organizations' programs do not target soybeans, avocados, or macadamia nuts.

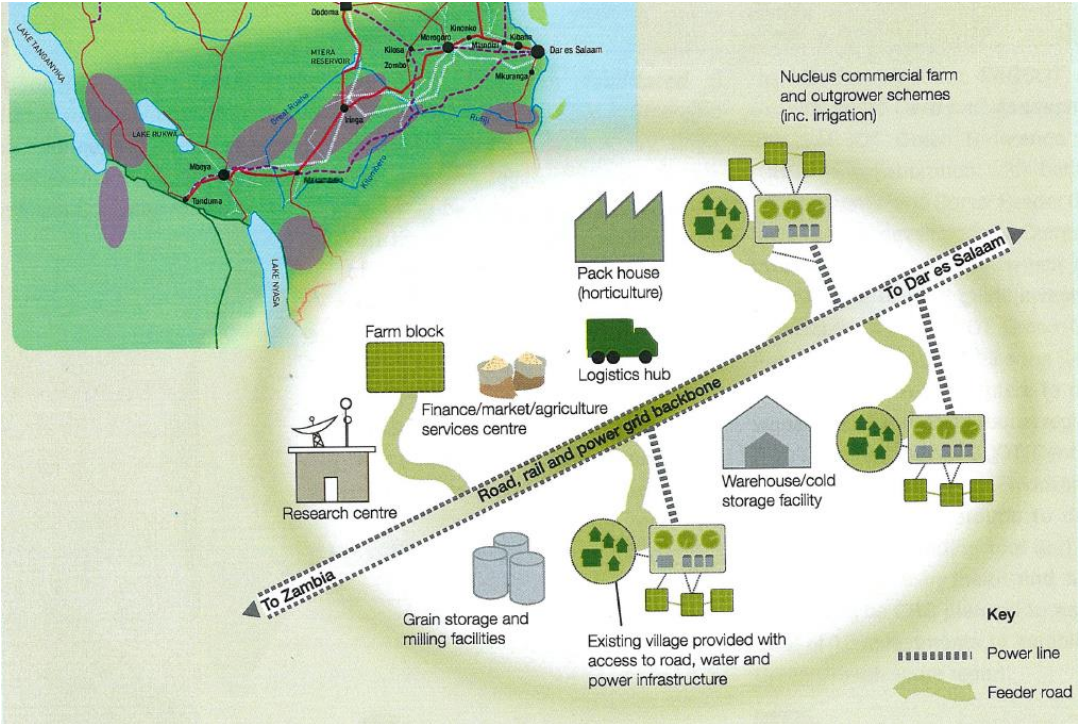
(7) SAGCOT Center Ltd. (VC cooperation)

SAGCOT Center Ltd. is a semi-governmental organization under the supervision of the Tanzanian government, the Chamber of Commerce, and the Agricultural Council of Tanzania (ACT)<sup>42</sup>. The SAGCOT program (2010 to 2030) has been implemented with the support of DFID, USAID, and the WB in the regions of Morogoro, Iringa, Njombe, Mbeya, and Rukuwa, targeting grains (e.g., rice, maize, wheat, and sorghum), sugarcane, and livestock.

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<sup>42</sup> The ACT was established in 2005 to benefit private companies in the agriculture sector. As of November 2019, 178 agricultural organizations and farmers' cooperatives (including agriculture, livestock, aquaculture, and forestry) are affiliated with the ACT. These organizations work with rice, maize, and sunflowers as cash crops. (Source: interview with ACT)

In each target area, the Tanzanian government developed infrastructure, such as roads and electricity, as indicated by Figure 5-22. It also forms clusters that store, wholesale, process, and transport the agricultural produce supplied by a farm block. The SAGCOT program set the goals of 1) developing 350,000 ha of farmland, 2) generating 420,000 employees, 3) benefiting 100,000 smallholder farmers, and 4) raising five million USD, all by 2030. As a result, the SAGCOT project promoted the commercialization of farming by 94,000 smallholder farmers and generated 1,200 employees through the commercialization of agriculture by stallholder farmers.<sup>43</sup>



**Figure 5-22: SAGCOT’s cluster model**

Source: SAGCOT

(8) Private Agricultural Sector Support (PASS)

After the completion of the Financial Incursion Project supported by the Danish International Development Agency (DANIDA; 2002 to 2006), PASS has continued its project activities as a financial trust foundation since 2007. PASS engages in the programs of partner organizations, such as the WFP and the Rockefeller Foundation, to 1) improve smallholder farmers’ financial access and 2) strengthen the linkage between financial institutions and farmers. In addition, PASS assists individual farmers and farmers’ organizations in making business plans and will conduct a Feasibility Study for a business plan if needed. These services are free of charge for farmers and farmers’ organizations.

<sup>43</sup> Source: <http://sagcot.co.tz/> (Accessed on February 18, 2020).



(9) Tanzania Agriculture Development Bank (TADB)

The TADB is a Tanzanian governmental organization for smallholder farmers established in 2015. It has four branches nationwide, and the TADB cooperates with private financial institutions on service delivery at the field level. The TADB finances the agricultural investments of individual farmers, farmers' cooperatives, and large-scale farmers through the Smallholders Credit Guarantee Scheme. Within this scheme, the African Development Bank provides financing to build storage and purchase agricultural machinery through the TADB. IFAD collaborates with the TADB to manage agricultural cooperatives' storage and enhance their marketing skills.

(10) Agriculture Incubation Center (AIC)

With financial support by DANIDA, PASS has managed the AIC and started the Agribusiness Incubation Program in 2018 at the Sokoine University of Agriculture (SUA) in the Morogoro region (horticulture) and in Dodoma City (processing) and the Congwa district (livestock) in the Dodoma region. At the SUA, the AIC provides incubators for young people in the agriculture sector (i.e., SUA graduates) and enhances their knowledge and skills as



PASS officers interviewing to the participants about the program's effects

entrepreneurs in the cultivation and marketing of horticulture crops, such as tomatoes and onions. Twenty young graduates participated in 2019, and 40 joined in 2020; among them, some will begin cultivating sesame in 2020. Graduates of the program are expected to purchase their own screen houses in collaboration with the TADB and continue working in agriculture independently. PASS pointed out that program graduates tend to be headhunted by private companies rather than starting their own businesses. Additionally, the water pipes that connect neighboring water source and AIC facilities have been broken and needs to be replaced. According to some of the participants, PASS does not provide sufficient marketing assistance.

## 5.7. Workshop results

(1) Outline of the workshop

Date: November 29, 2019 (Fri.) 9:30-13:00

Venue: Golden Tulip City Center Hotel (in Dar es Salaam)

Participants: 47 (government/public organizations: 23, private companies/associations: 24)

Program: The Survey Team conducted the workshop according to the following schedule.

Time	Activities	Responsibility
09:30–10:00	● Admission	● Survey Team
10:00–10:05	● Opening remarks	● JICA Tanzania Office
10:05–10:15	● Introduction of participants ● Explanation of objectives, expected outputs, and the workshop program	● Survey Team
10:15–10:30	● Presentation of the survey results and FVC development project concepts	● Survey Team (Dr. Kotegawa) Sesame
10:30–10:45		● Survey Team (Dr. Ikeda) Avocados
10:45–11:00		● Survey Team (Mr. Machida) Macadamia nuts
11:00–11:50	● Group discussion (Three groups of participants with interest in the same target crop are formed)	● Survey Team
11:50–12:05	● Sharing the results of each group’s discussion, Q&A	● Survey Team (Sesame)
12:05–12:20		● Survey Team (Avocados)
12:20–12:35		● Survey Team (Macadamia nuts)
12:35–12:55	● Closing remarks	● Ministry of Agriculture
12:55–13:00		● JICA Tanzania Office
13:00–14:00	● Lunch and networking at 21 <sup>st</sup> Floor (end of the workshop)	● Survey Team

## (2) Activities in the workshop



Introducing macadamia nuts, a crop that was unknown to government officials and farmers



A participant presents the extracted comments and information



Participants are listening intently to the presentation

## 5.8. Environmental and social legislative framework for agricultural investment in Tanzania

### 5.8.1. Main policies, laws, and regulations related to environmental impact assessment (EIA)

Table 5-23 shows the main policies, laws, and regulations related to EIA in Tanzania.

**Table 5-23: Main policies, laws, and regulations related to EIA**

Policy, Law, or Regulation	Outline
The Constitution of the United Republic of Tanzania 1997 (as Amended)	Article 27-(1) “Duty to safeguard public property” stipulates that every person has the duty to protect the natural resources of the United Republic, the property of the regional authority, and all property collectively owned by the people and also to respect another person’s property.

The National Environmental Policy (NEP; 1997)	The NEP is the main policy document governing environmental management in Tanzania. One of the objectives of the NEP is to prevent and control the degradation of land, water, vegetation, and air, which constitute people’s life support system. The policy also emphasizes the use of environmentally-friendly pesticides to minimize water pollution, the efficient use of water in irrigation, and the minimization of soil erosion in forests, grasslands (grazing lands), and wetlands.
Environmental Management Act (EMA), CAP 191, 2004	For the effective implementation of the NEP objectives, this Act identifies and outlines specific roles, responsibilities, and functions of various key players and provides a comprehensive administrative and institutional arrangement (Ministry of Agriculture, National Environment Management Council (NEMC), sector ministries, local governments, etc.). Part VI, Sub-section 81 (1) of the act discusses EIAs.
Environmental Impact Assessment and Audit Regulations, 2005	<p>The Environmental Impact Assessment and Audit Regulations (2005) are included under EMA No. 20 of 2004. The regulations provide a basis for undertaking EIAs as decision making processes and Environmental Audits (EAs) for various development projects with significant environmental impacts in Tanzania. Like this act, the following regulations are also developed under the EMA.</p> <ul style="list-style-type: none"> <li>• Environmental Management (Water Quality Standards), regulations, 2007-G.N. 239</li> <li>• Environmental Management (Soil Quality Standards), regulations, 2007 – G.N. 238</li> <li>• Environmental Management (Air Quality Standards), regulations, 2007 – G.N. 237</li> <li>• Environmental Management (Control of Ozone Depleting Substances), regulations, 2007 – G.N. 240</li> </ul>

Source: The Survey Team

### 5.8.2. EIA system in Tanzania

The EIA system in Tanzania is developed under the Environmental Impact Assessment and Audit Regulation, 2005, and the overall EIA process and the estimated number of days required for each process are summarized in Table 5-24.

**Table 5-24: EIA process and time frame in Tanzania**

EIA Process	Responsible Institution	Time Frame
Registration	Proponent and NEMC	
Screening	NEMC	45 Days
Scoping	Proponent, MAFC	
Review/approval of ToR	NEMC	14 Days
Impact Assessment	Proponent, MAFC	
Review	NEMC, MAFC	60 Days
Decision making	Minister of Environment	30 Days
Project Implementation (validity of the certificate)	Proponent	Within 3 years
Monitoring and Auditing	Proponent, NEMC, DoE, MAFC, LGAs	
Decommissioning	Proponent, NEMC, MAFC, LGAs	

Note: Terms of Reference (ToR) for the impact assessment is prepared and is submitted to NEMA by proponent.

NEMC: National Environment Management Council, DoE: Department of the Environment, LGAs: Local Government Authorities, MAFC: Ministry of Agriculture, Food Security, and Cooperatives

Source: MAFC (2013) Agricultural Sector EIA Guidelines

The Survey Team interviewed local stakeholders and confirmed the latest changes to the EIA system in Tanzania, especially in the agricultural sector, as shown below:

(1) Agricultural Sector EIA Guidelines (2013)

The EIA sectoral guidelines for agriculture were developed by the Ministry of Agriculture, Food Security, and Cooperatives (MAFC) in collaboration with experts from the Vice President’s Office (VPO) – Division of the Environment, the NEMC, and Ardhi University. The guidelines are designed to provide agricultural project developers and all stakeholders engaged in the listed agricultural projects with guidance on formulating and implementing sound projects that reduce adverse environmental, social, and health impacts. In addition, this sector is planning to implement projects within big flagship projects, such as the SAGCOT project (see Section 5.6); thus, these guidelines will be very useful for sustainable development projects.

In these guidelines, expected typical activities, environmental impacts, and mitigation measures in the agricultural sector are introduced. In the agricultural sector, the types of projects that are required to submit an EIA report are as follows: (i) large-scale cultivation projects, (ii) water resource development projects (e.g., dams, water supply projects, flood control, irrigation, and drainage), (iii) large-scale mono-culture (cash and food crops, including floriculture), (iv) biological pest control, (v) agricultural projects necessitating the resettlement of communities, (vi) introductions of new breeds of crops, and (vii) introductions of genetically modified organisms. Notably, there is no specific threshold value that defines “large-scale,” but the NEMC

takes project characteristics into consideration in the project screening process as a part of the EIA. This sectoral guideline has not yet been disclosed to the public, but investors can access it through the MAFC as needed.

(2) Issuing “provisional EIA certificates”

This new system grants a provisional EIA certificate upfront to intended investors within three days of an application being received by the issuing authorities, even as the EIA is in progress. According to the VPO, the Government of Tanzania (GOT) made this decision because it received endless complaints from potential investors regarding inordinate delays in granting EIA certificates. In response to these complaints, the GOT is trying to improve the business environment by introducing the provisional EIA certificate system<sup>44</sup>. Needless to say, the introduction of this system requires more rigorous environmental monitoring mechanisms than were used before.

5.8.3. Legislative framework related to land acquisition and resettlement in Tanzania

(1) Main policies, laws, and regulations related to land acquisition and resettlement in Tanzania

Table 5-25 describes the main laws related to land acquisition and resettlement in Tanzania. Many laws were written nearly 20 years ago, and some have been reviewed for amendments in recent years. In 2016, the National Land Council (NLC) led a gathering of stakeholders, including the private sector, to review of the National Land Policy (NLP), no revision was agreed upon because no specific requests to make significant changes to the current policy were made.

The Survey Team was also informed that the GOT has not planned to regulate foreign capital (e.g., by limiting the land lease period or area for foreign companies)<sup>45</sup>.

**Table 5-25: Main policies, laws, and regulations related to land acquisition and resettlement in Tanzania**

Policy, Law, or Regulation	Outline
NLP 1997	The NLP aims “to promote and ensure a secure land tenure system, to encourage the optimal use of land resources and to facilitate broad-based social and economic development without endangering the ecological balance of the environment.” The policy also requires that lands not be allocated to individuals for development purposes if they are susceptible to certain development effects (e.g., forests, river basins, biodiversity areas, national parks, etc.).
The Land Act 1999	The Land Act lays down fundamental principles for occupying and using

<sup>44</sup> The Citizen (2018) <https://www.thecitizen.co.tz/oped/EDITORIAL--Issuing--provisional--EIA-certificates-fine--but---/1840568-4654012-r0ovx2z/index.html>

<sup>45</sup> Hearing of the NLC (2019)

Policy, Law, or Regulation	Outline
	<p>land in Tanzania. The Act stipulates the categorization of land and its tenure, administrative procedures, occupancy rights, rights of possession and exchange, land leases, easement, and so on.</p> <p>A non-Tanzanian individual or company may have the right to occupy land or the attendant rights if the land is used for an investment purpose specified by the Tanzania Investment Law. The land lease period is decided by the NLC in consultation with the Tanzania Investment Centre (TIC), depending on the nature of the project.</p>
Village Land Act 1999	<p>Village Land Act No. 5 of 1999 governs village land and all matters related to land tenure under the Village Councils. Village land includes all land inside the boundaries of registered villages. The Village Councils are responsible for managing village lands for sustainable development. Villages located in peri-urban areas are not included under this Act but rather under the Land Act.</p>
Land (Assessment of the Value of Land for Compensation) Regulations, 2001	<p>These regulations stipulate the assessment of assets (lands, houses, trees, etc.) for compensation. Valuations are made based on the market price. In the agricultural sector, the Chief Valuer in the Ministry of Land submits a result for valuation to the Permanent Secretary of the MAFC (Project Proponent), and land acquisition and resettlement occur after the MAFC has paid compensation to the Project Affected Persons (PAPs). Agricultural products, such as fruit trees and crops, that are affected by the project are valued by Department of Agriculture staff in the targeted region.</p>
Land (Compensation Claims) Regulations, 2001	<p>The regulations are applied to the all compensation and claims in the federal government, local government, and public institutions with the exception of village land, as the Village Land Councils have the power to resolve such land disputes. The regulations also define the affected people that are eligible for compensation or resettlement.</p>
Road Sector Compensation and Resettlement Guidelines of the United Republic of Tanzania, 2009	<p>These guidelines relate to properly managing land acquisition and the resettlement of affected people in the road sector. Notably the “CRP: Compensation and Resettlement Plan” mentioned in the guidelines is not always recognized by other sectors.</p>

Source: The Survey Team

## (2) Resettlement Action Plan (RAP)

According to several local consultants and persons in charge of the Ministry of Agriculture’s environmental department interviewed by the Survey Team, land acquisition and the resettlement of people affected by projects are carried out in compliance with The Land Act if the project proponent is the GOT or Tanzanian companies, whereas, for projects financed by donor agencies, the safeguard policy “ESS5 (Environmental and Social Standards No.5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement) under Environmental and Social Framework (ESF)”<sup>46</sup> (the former safeguard policy, called Operational Policy 4.12 Involuntary Resettlement Project, is applied for projects launched before 2018) is applied for the preparation of a RAP. A project proponent submits a RAP report prepared by the Consultant to the Ministry

<sup>46</sup> World Bank (<https://www.worldbank.org/en/projects-operations/environmental-and-social-framework>)

of Land, and the Government Chief Valuer primarily reviews the valuation methods and the entitlement matrix in the report.

#### 5.8.4. Current Issues

Current issues related to environmental and social considerations in the Tanzanian agricultural sector are identified as follows.

- In principle, investors who need land for agricultural investments in Tanzania should first consult the TIC, and they should contact the local governments of the proposed site after issuing a Certificate of Incentives. However, direct contact with landowners and local influential persons is not rare in many cases owing to the complicated and prolonged public procedures, causing conflicts later.
- Inadequate compensation payments and corruption preventing true PAPs from receiving full compensation are frequently reported. In one example, the payments went to the district council and the landlord<sup>47</sup>. In another case, the payment of compensation took seven years<sup>48</sup>. Thus, careful monitoring is required not just in the planning stage but also for the execution of the actual payment.
- Because there are no maps of rural areas, if a villager wishes to register his/her land, he/she must hire a surveyor from the district land department. However, only people who can pay for the surveyor's labor, daily allowance, accommodation, transportation, and so on can hire a surveyor.<sup>49 50</sup>
- In particular, it is said that pastoralists, which are estimated to have a population between 3 and 4 million in Tanzania, originally lacked a concept of settling down, and land registration has not progressed. However, the establishment of national parks and the attraction of private investment projects have caused the so-called "green grabbing" problem in which past grazing lands cannot be accessed.
- Figure 5-23 shows a resource map created through participatory workshops by pastoralists and agro-pastoralists conducted by the Sustainable Rangeland Management Project and implemented by the International Land Coalition with the support of IFAD. Their homes, lands under cultivation, and grazing lands can also be seen in satellite images. However,

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<sup>47</sup> Sulle and Nelson, 2009, *Supra*

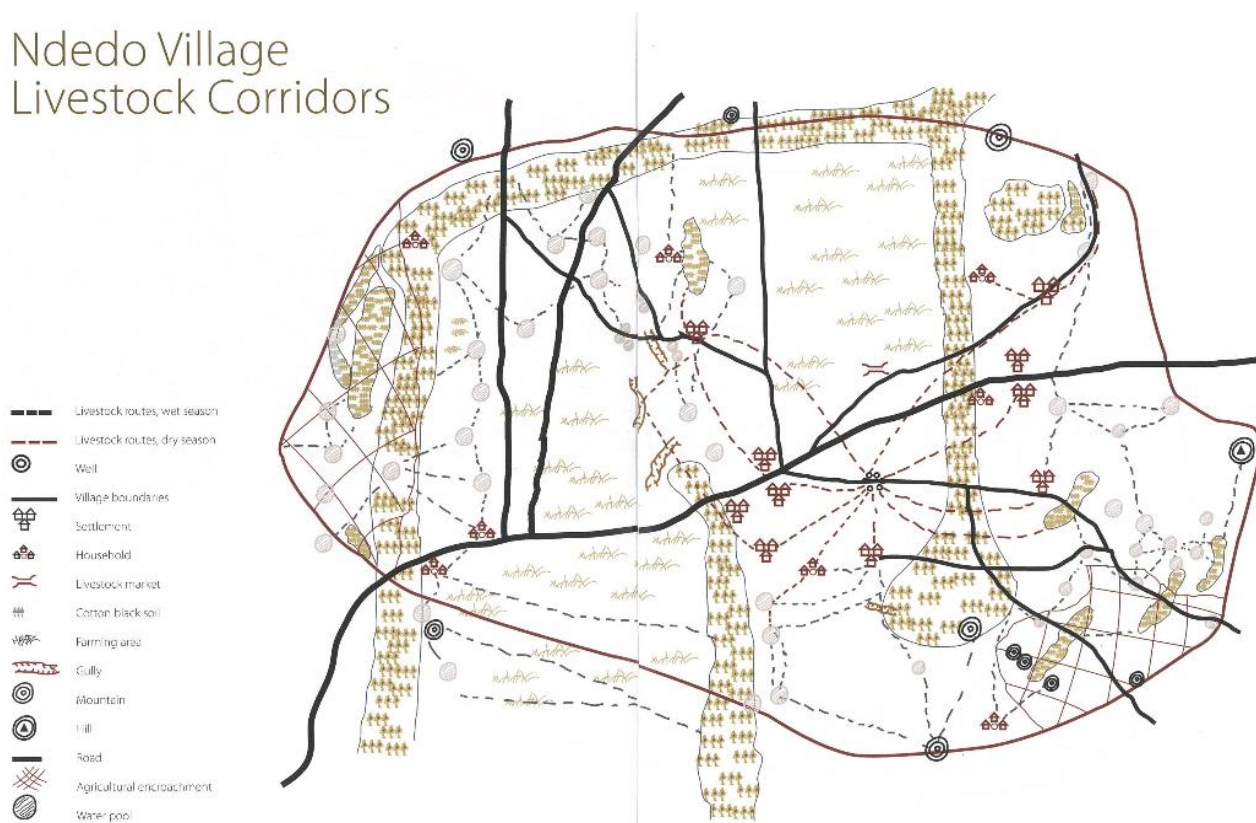
<sup>48</sup> Massay G. *Supra*

<sup>49</sup> Amemiya (2004) Land Property Rights on "Tanzania Village Land Act, 1999" —Comparative Study with the Theory of "A Group of Householders Using the Commons as a Mini-Corporate Body" (Kato (1996))

<sup>50</sup> According to the Director of the Ministry of Lands, Housing, and Human Settlement Developments, interviewed by the Survey Team in 2019, roughly 70% of the country's population does not possess legal paperwork for land registration, although he does not have exact figures.

information that is essential to their lives, such as the grazing routes of different types of livestock in the rainy and dry seasons and the only hills in the village that mobile phones can reach must be identified through these participatory workshops because these aspects are often overlooked. Then, it is necessary to "visualize" this information using GIS or the like. In this way, considering the development plan together with residents will minimize the negative impact on the community due to future development projects and will help to formulate a sustainable business plan that takes the community into consideration.

## Ndedo Village Livestock Corridors



**Figure 5-23: An example of participatory mapping in Ndedo village in Tanzania**

Source: International Land Coalition (2012). Participatory rangeland resource mapping as a valuable tool for village land use planning in Tanzania

### 5.9. Legislative framework for agricultural investments in Tanzania

According to the Procedure for Obtaining TIC Certificates of Incentives, the TIC grants Certificates of Incentives under the Tanzania Investment Centre Act of 1997. In addition to issuing these certificates, the TIC's services for investors include assistance with company establishment, company registration, securing land in EPZs, provision of the latest information about investment opportunities, and coordination with other stakeholders, such as the Tanzania Chamber of Commerce, Industry, and Agriculture; the Confederation of Tanzania Industries; the Tanzania National Business Council; and the Tanzania Private Sector Foundation.



Investment opportunities available on the mainland of Tanzania are categorized into eleven sectors, including “Agriculture and Livestock.” To qualify for and obtain a TIC Certificate of Incentives, the minimum fixed investment cost for New, Rehabilitation, and Expansion Projects is at least 100,000 USD for projects that are wholly owned by Tanzanian citizen(s) and 500,000 USD for projects that are wholly owned by foreign investors and for joint ventures.

**■ The incentives package available to holders of TIC Certificates of Incentives (10 and beyond are of particular relevance to the agricultural sector)**

- ① Access to various services related to permits, licenses, and approvals in the TIC One Stop Facilitation Centre. The following services are currently available: immigration services, labor services, Tanzania Revenue Authority services, Ministry of Lands and Human Settlements services, TBS services, Business Registration and Licensing Authority services, NEMC services, Occupational, Safety, and Health Authority services, Tanzania Food and Drugs Authority services, and Tanzania Electric Supply Company Limited services.
- ② The recognition of private property and protections against any non-commercial risks. Tanzania is an active member of the World Bank Foreign Investment Insurance wing of the Multilateral Investment Guarantees Agency. Likewise, Tanzania is a member of the International Centre for Settlement of Investment Disputes, which is also affiliated with the WB.
- ③ Zero percent (0%) import duty on project capital goods; computers and computer accessories; raw materials and replacement parts for agriculture, animal husbandry, and fishing; human and livestock pharmaceuticals and medicaments; motor vehicles in completely knocked-down form; and inputs for manufacturing pharmaceutical products.
- ④ Ten percent (10%) import duty for semi-processed and semi-finished goods.
- ⑤ Twenty-five percent (25%) import duty for final consumer goods.
- ⑥ Value-added tax (VAT) for taxable goods and services of 18%. Note that a destination inspection of commercial imports with an FOB value of 5,000 USD and above is mandatory.
- ⑦ Introduction of a pay-and-refund scheme for excise duties paid on fuel purchased by eligible companies.
- ⑧ 100% capital expenditure in the agricultural sector.
- ⑨ The Income Tax Laws allow 50% capital allowances in the first year of use for plants and machinery used in manufacturing processes and fixed in a factory, used for fish farming, or used to provide services to tourists and in hotels. Thereafter, wear and tear rates apply to the remainder, as below (Class No. 5 Buildings, structures, dams, water reservoirs, fences, and similar works of a permanent nature used in agriculture, livestock Farming, or fishing farming: 20% of depreciation rate)

- ⑩ The supplies and imports exempted from the VAT are agricultural implements, agricultural inputs (i.e., pesticides, fertilizers, and insecticides), livestock, basic agricultural products, and foods for human consumption (i.e., rice, sorghum, millet and other cereal crops, maize flour, and wheat flour).
- ⑪ Corporate Tax of 30% with a 25% corporate tax for companies newly listed to the Dar es Salaam Stock Exchange with at least 30% of its shares issued to the public for three consecutive years from the date of listing.
- ⑫ The right to transfer outside of the country 100% of foreign exchange earned, profits, and capital.
- ⑬ Land rent on commercial agricultural farms, livestock ranches, and forests of 200 TZS per acre per annum<sup>51</sup>.

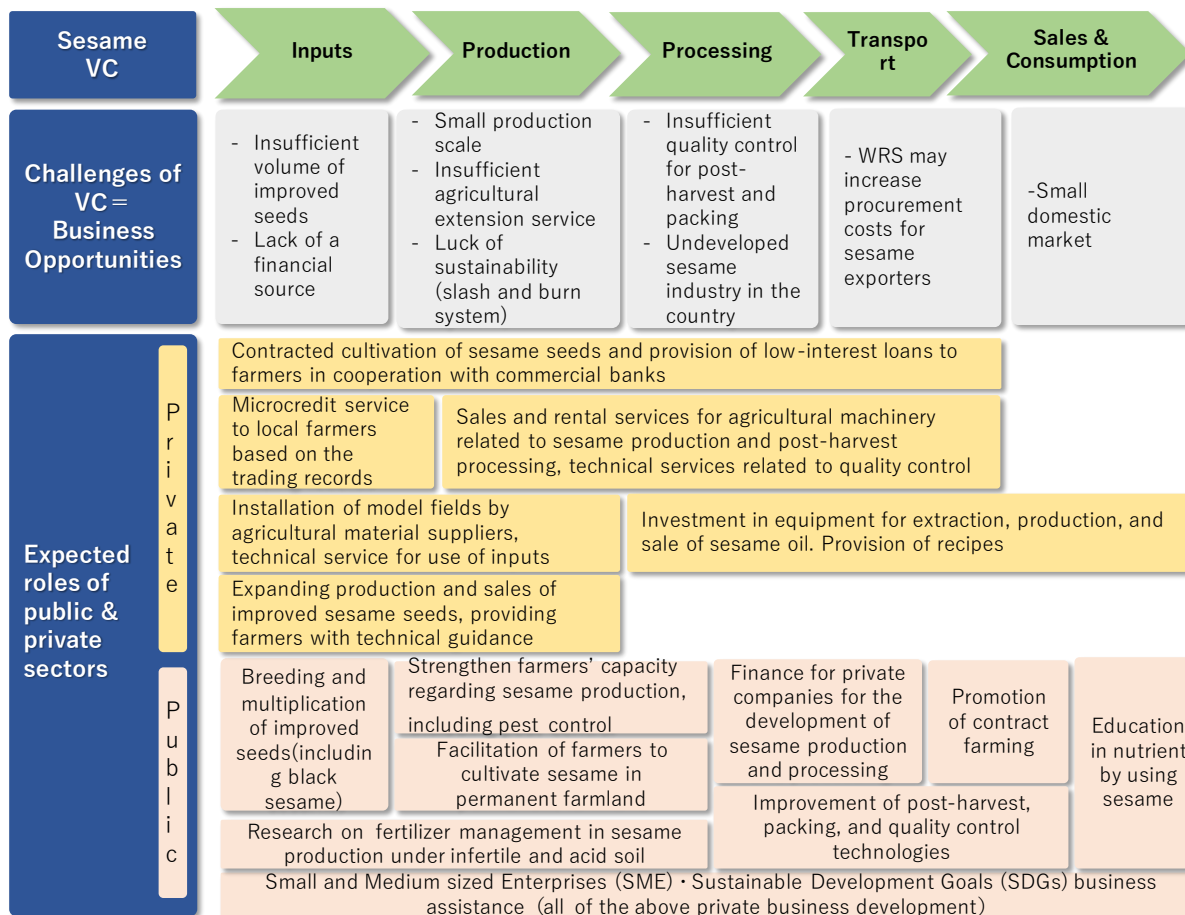
## **5.10. Concepts of PPP projects in Tanzania**

### **5.10.1. Sesame VC development projects**

Figure 5-24 shows the proposed PPPs for sesame. To realize stable sesame production, it is expected that the private sector will promote the production and distribution of superior seeds and provide farmers with technical services related to fertilization and agrochemical management. With regard to seeds in particular, measures to increase production, including the CBSP approach, are necessary, as the number of farmers using superior seeds has increased rapidly in recent years. The private sector is also expected to provide low-interest loans through contract farming and commercial banks to improve farmers' access to financing and provide credit services based on farmers' transaction records. Conversely, the role of the government is 1) to develop and disseminate sesame varieties with high marketability, including black sesame, and 2) to develop and disseminate fertilizer and agro-chemical management technologies in cooperation with the private sector, thereby promoting sustainable sesame production through constant cultivation. In the processing and distribution sector, the domestic sesame industry is underdeveloped, and quality control by the WRS has become an issue. Investments in the sesame food-processing sector and private services (e.g., sales and rental of agricultural machinery and technical guidance) related to post-harvest treatment (e.g., drying, sorting, and packing) for AMCOS are expected. However, the government should provide technical guidance in cooperation with the private sector and promote the utilization of low-interest loan and investment schemes.

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<sup>51</sup> Assuming TZS 1 is equivalent to JPY 0.047, TZS 200 is about JPY 9.5, and given that one acre is equivalent to 4,046 m<sup>2</sup>, an investor who obtains a Certificate for Incentive can borrow ten hectares of land for ten years with only JPY 2,300 (about USD 20).



**Figure 5-24: Sesame VC development sheet for Tanzania**

Source: The Survey Team

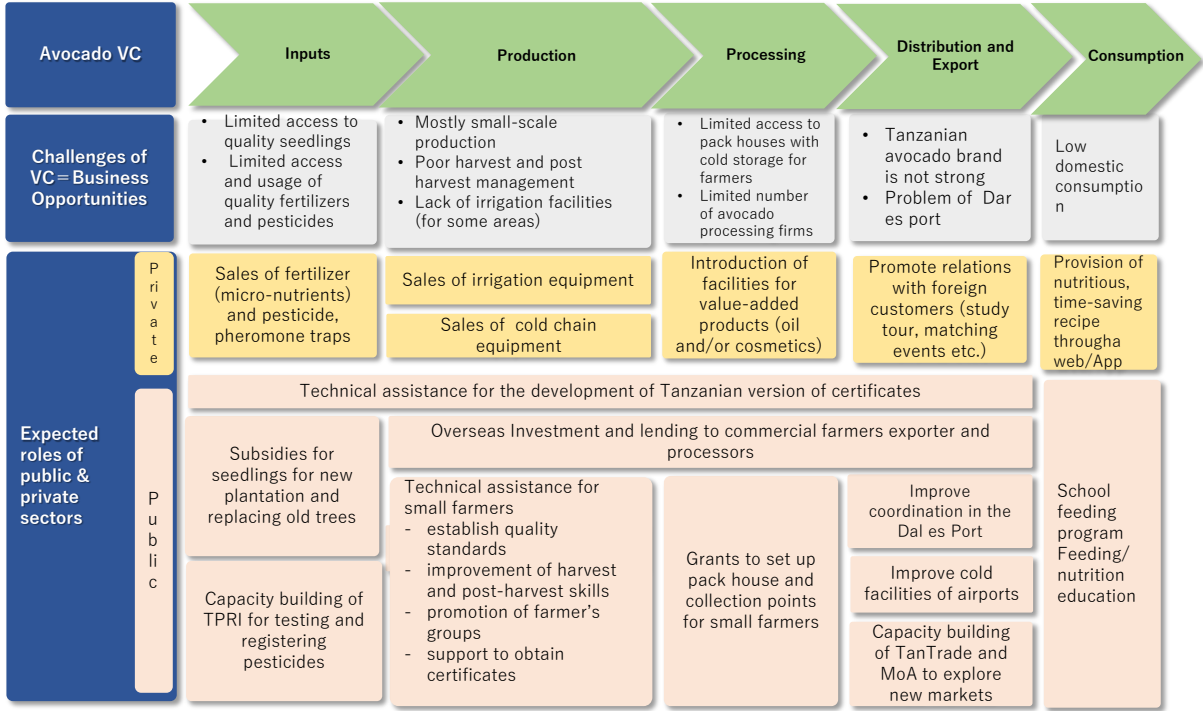
### 5.10.2. Avocado VC development projects

Figure 5-25 shows some ideas for PPP projects for developing the avocado VC in Tanzania. Private firms can provide and sell various goods to the players in each part of the VC, upgrading the entire avocado VC. For example, they can sell quality fertilizers that are not currently available to farmers, irrigation equipment that enables farmers to improve their water management, refrigerators and reefer trucks to mitigate cold chain limitations, and processing equipment and facilities that expand the production capacity of high value-added products. In addition, it is possible for exporters to enhance their relations with foreign customers through study tours and matching events.

International donors can promote investments in this sector by providing investments and lending to avocado farmers, exporters, and processors. In addition, they can provide technical support to farmers in terms of harvest and post-harvest management, which are serious issues in the VC. The difficulty accessing quality seedlings and pack houses can be mitigated through financial support to farmers to purchase quality seedlings, introducing certificates for seedlings,

and setting up pack houses for groups of small farmers.

Countermeasures to the issue of high transportation costs can include enhancing refrigeration capacity in the port of Dar es Salaam and setting up cold facilities in Songwe airport. It is also effective to provide technical support to the Ministry of Agriculture and TanTrade to enhance their capacities to explore new markets.

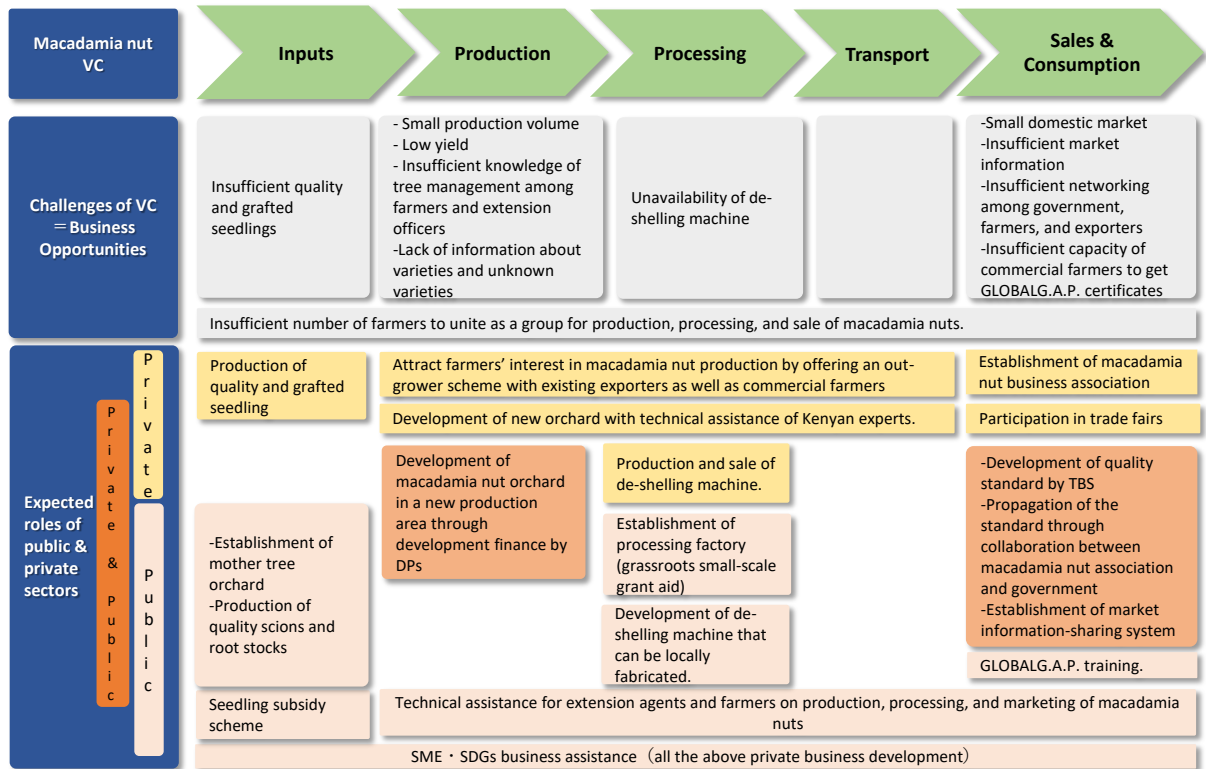


**Figure 5-25: Avocado VC development sheet for Tanzania**

Source: The Survey Team

5.10.3. Macadamia nut VC development projects

Figure 5-26 shows PPP project concepts for developing the macadamia nut VC. Inputs face few issues, but the dissemination of quality seedlings of appropriate varieties is an urgent matter. The establishment of a mother tree orchard, the production and provision of quality scions and root socks by the public sector, and the production of seedlings by the private sector using planting materials to be provided by the public sector are expected. As a vast land area is suitable for macadamia cultivation, an increase in production can be achieved by large companies through the establishment of large-scale plantations or mass production via an out-grower scheme with small-scale farmers leveraging private sector finance from DPs. As for processing, the production of nut-crackers is a business opportunity for local fabricators, and DPs can establish processing facilities to employ female workers.



**Figure 5-26: Macadamia nut VC development sheet for Tanzania**

Source: The Survey Team



## **Chapter 6. FVC survey in Zambia**





## **Chapter 6. FVC survey in Zambia**

### **6.1. Introduction to the FVC survey**

The Survey Team studied the VCs of soybeans, chicken meat, and cultured fish in Zambia. The Survey Team studied discovered that the three VCs are closely related, as soymeal, a major processed soybean product, is a primary component of chicken and fish feed. Currently, soybean production does not meet domestic demand, and soybean imports are limited. As a result, Zambia has a shortage of processed soybeans, including soymeal, leading to an increase in feed prices. This chapter describes the results of the VC study and then presents the concepts of VC development projects through public-private partnerships.

### **6.2. Soybean VC**

#### **6.2.1. Overview**

##### **(1) Background and objectives of the soybean VC survey**

Soybean production is the third largest among crops in Zambia, following maize and peanuts. The land area used for the production of soybeans has increased significantly. The expansion in soybean production does not just reflect the increase in demand at the domestic and international levels. The nutritive value of soybeans as an important protein source for Zambia's under- or poorly nourished population has contributed to its popularity as a cereal. Zambia's Biosafety Act<sup>1</sup>, introduced in 2007, permits the use of genetically modified crops only on a strictly regulated basis. The implementation of this policy provides assurance to several Japanese companies that have shown interest in handling non-genetically modified soybeans (with white eyes) in Zambia. Thus, given the commercial and nutritive importance of soybeans, studying and investigating the possibility of expanding their VC in Zambia is of great interest. The objectives of this survey are to clarify the current situation of the soybean VC by identifying the issues that could hinder Japanese companies from investing in this crop and to propose the necessary solutions to these issues.

##### **(2) Soybean VC**

Figure 6-1 shows an overview of the soybean VC. The main agricultural inputs related to soybean production are 1) seeds, 2) fertilizers, and 3) pesticides. In recent years, small-scale farmers have sought to use rhizobium inoculants supplied by agro-dealers. There are basically two types of soybean producers: small-scale farmers and commercial farmers (or agricultural companies). The production scales of the two types are about one to two hectares and several hundreds to several thousands of hectares, respectively. Harvested soybeans are purchased by

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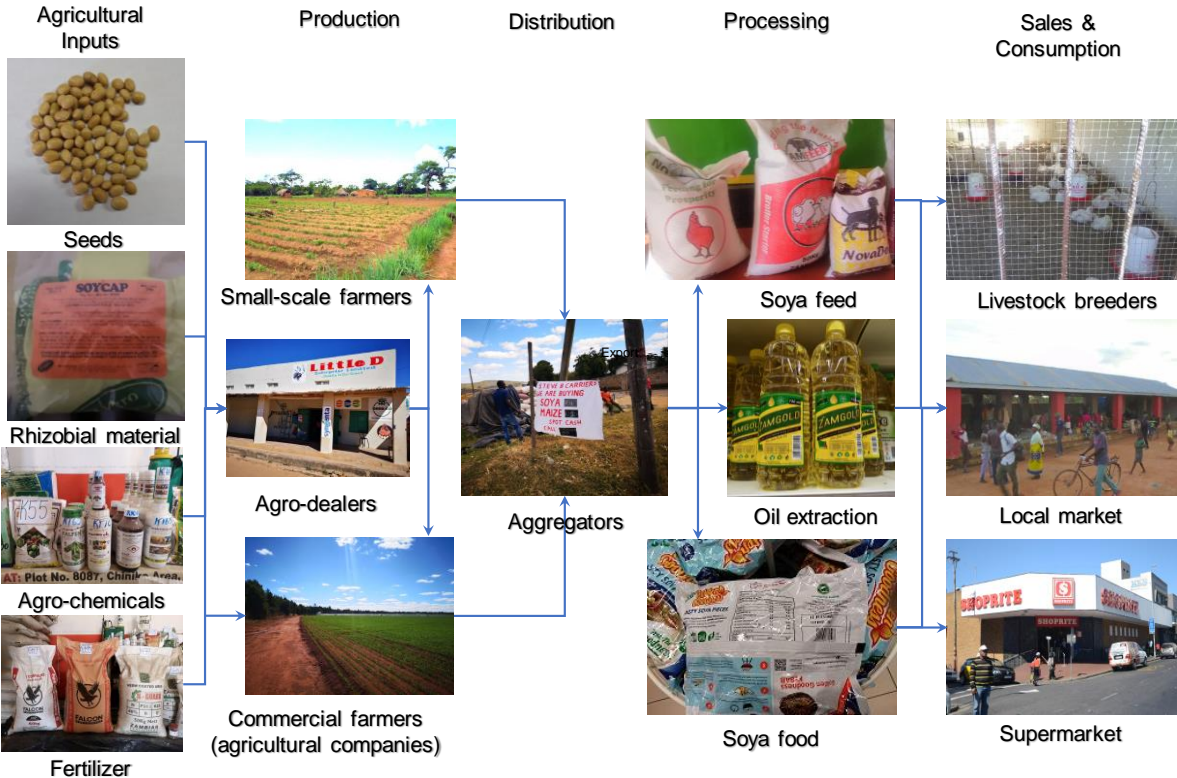
<sup>1</sup> The Biodiversity Act, 2007 (No. 10 of 2007)

aggregators and transported to soybean processors, and some are exported overseas. Soybeans are broadly processed for applications, such as 1) oil extraction, 2) soybean food, and 3) soybean feed, which are delivered to consumers in the market. Table 6-1 shows soybean prices in each stage of the VC.

**Table 6-1: Price in each stage of the soybean VC**

Farm gate price	2.7–4.5 ZMK <sup>2</sup> /kg	21 Yen/kg–34 Yen/kg (ZMK = 7.47 Yen)
Wholesale price	4.0–5.8 ZMK/kg	30 Yen/kg–43 Yen/kg (ZMK = 7.47 Yen)
Retail price	4.0–6.0 ZMK/kg	30 Yen/kg–45 Yen/kg (ZMK = 7.47 Yen)

Source: The Survey Team



**Figure 6-1: Overview of the soybean VC in Zambia**

Source: The Survey Team

6.2.2. Agricultural inputs

(1) Soybean seeds

Soybean seeds are mostly produced by seed and seedling suppliers in Zambia. The main seed and seedling companies include Zamseed, Panner, MRI, Kamano, Seedco, and Stewards Global. These companies supply seeds that they produce themselves and seeds that their contracted seed cultivators produce. For example, Seedco owns about 380 ha of land for seed production, including for soybean seeds. In addition, they produce about 3,000 ha of home-grown seeds and

<sup>2</sup> Zambian Kwacha

seeds in collaboration with contract seed cultivators. The major seed and seedling companies develop soybean varieties with the cooperation of the International Tropical Agriculture Research Institute (IITA), among others. The screening and registration of developed soybean varieties are conducted by the Zambian Agricultural Research Institute (ZARI). Four white-eye soybean varieties, including one in the development stage, are identified by this survey. Table 6-2 shows the characteristics of these four varieties. According to a discussion conducted with Seedco, the domestic market for white-eye soybeans is dominated by the distribution of Safari seeds because, relative to other varieties, these seeds require a short cultivation period, take a relatively long time for shattering, and suffer low harvest loss. The IITA Genotype is a white-eye soybean variety currently being developed by the IITA. The breeding of this new variety is further improved by comparing its performance with that of Safari; the new variety is more resistant to soybean rust than Safari seeds are.

**Table 6-2: Characteristics of white-eye soybean varieties**

Name of Variety	Supplier	Potential Yield	Days to Maturity	Days to First Shattering	Mass of 1,000 Seeds	Protein Content	Oil Content
Safari	Seedco	4.7 tons/ha	122 days	29 days	195 g	46%	19%
Squire	Seedco	4.2 tons/ha	128 days	24 days	230 g	47%	19%
Lukanga	Zamseed	N/A	N/A	N/A	N/A	N/A	N/A
IITA Genotype	IITA (Not released)	N/A	N/A	N/A	N/A	N/A	N/A

Source: The Survey Team (based on information from suppliers)

## (2) Fertilizers

Zambia depends on imported fertilizers, which are essential for its soybean production. Table 6-3 shows the annual value of the three imported fertilizer components. The annual import value of nitrogen fertilizer is the highest among the three components, and the major exporters to Zambia are South Africa, China, United Arab Emirates (UAE), and Mozambique. In addition to nitrogen, phosphorus is a component that is easily depleted in Zambia's farmland soils, and its major exporters to Zambia include South Africa, China, and Jordan. In recent years, the existence of ores containing large amounts of phosphorus components have been confirmed in four locations in Zambia, and the utilization of this phosphorus as a fertilizer resource is expected<sup>3</sup>. The annual import value of potassium fluctuates year to year, and the major exporters to Zambia include South Africa, China, Mozambique, and Jordan<sup>4</sup>.

<sup>3</sup> "Agronomic Suitability of Ground Phosphate Rocks from Sinda and Isoka Districts of Zambia Treated with Sulphuric Acid as Sources of Phosphorus for Maize (Zea mays)"

<sup>4</sup> Fertilizers are also imported from the countries through which they pass rather than from the countries that produce them.

**Table 6-3: Annual import value of fertilizer in Zambia (1,000 USD)**

	2014	2015	2016	2017	2018
N Fertilizer	203,547	235,764	N/A	383,910	270,451
P Fertilizer	2,899	2,284	N/A	2,264	587
K Fertilizer	16,546	4,330	N/A	8,466	6,845

Source: UN Comtrade

Fertilizer suppliers in Zambia include Nitrogen Chemical of Zambia (NCZ), Greenbelt Fertilizer, Zambian Fertilizer, and Export Trading Group (ETG). These companies mainly produce compound fertilizers by blending single fertilizers procured from abroad.

The most frequently distributed compound fertilizer in Zambia is called D Compound, which has a composition ratio of N:P:K:S = 10:20:20:6. In addition, compound fertilizers with different composition ratios are manufactured by several companies. For instance, Zambian Fertilizer manufactures a compound fertilizer called Soya Mix A (N:P:K:Ca = 7:20:13:9), which is suitable for soybean cultivation<sup>5</sup>.

### (3) Agro-chemicals

In Zambia, most pesticides and chemical fertilizers are also imported. Table 6-4 shows the import value of pesticides (including insecticides, fungicides, herbicides, etc.) in Zambia by year. Major exporters to Zambia include South Africa, China, UAE, and India. In some years, many pesticides are also imported from Japan.

**Table 6-4: Annual import value of agro-chemicals in Zambia (1,000 USD)**

	2014	2015	2016	2017	2018
Agro-chemicals	47,809	112,430	N/A	57,485	70,967

Source: UN Comtrade

Major pesticide suppliers in Zambia include Amiran Limited, CropChem, Agrochemical, and ETG. As for herbicides, insecticides, and fungicides, various products with different active ingredients have been distributed in Zambia, and guidebooks describing how to handle these products are provided to users by each agro-chemical supplier.

<sup>5</sup> Quoted from the product brochure of Zambian Fertilizer. Most of Zambia's soil is acidic (pH of 4.5–5.5), and the suitable soil pH for soybean growth is around 6.0–6.5, so the fertilizer contains a lime component.

(4) Rhizobium inoculant

In addition to seeds, fertilizers, and pesticides, rhizobium inoculants are frequently used in soybean production (Figure 6-2). In soybean production, nitrogen fixation is caused by indigenous rhizobia, but it is possible to increase the efficiency of nitrogen fixation by the providing rhizobium inoculant. The active agent in rhizobium is Bradyrhizobium japonicum, which is an acid-resistant bacterial species, and this inoculant is particularly used in tropical areas where soil is largely distributed<sup>6</sup>. In Zambia, ZARI produces and supplies rhizobium inoculant, but imported versions from South Africa have also been widely distributed in recent years.



**Figure 6-2: Rhizobium inoculant**

(5) Retail prices of input materials

The above-mentioned agricultural inputs are delivered to producers from their suppliers via Agro-dealer, which is found throughout Zambia. Table 6-5 shows the retail prices of representative products handled by Agro-dealer in the Serenje District of Central Province.

**Table 6-5: Retail price of agricultural inputs**

Product Type	Product Name	Supplier	Price	Remarks
Soybean seeds	Dina	MRI	ZMK 450/25 kg	Including inoculum, Black eye
	Lukanga	Zamseed	ZMK 405/25 kg	White eye
	Magoye	Zamseed	ZMK 405/25 kg	Black eye
	Spike	Seedco	ZMK 400/25 kg	Black eye
	Safari	Seedco	ZMK 422/25 kg	White eye
Fertilizer	D Compound	Zambian Fertilizer, Falcon, NCZ	ZMK 295-405/50 kg	
	Urea	Falcon, NCZ	ZMK 285-315/50 kg	
	Soya Mix A	Zambian Fertilizer	ZMK 360/50 kg	
Agro-chemicals	Jaguar 900	AIS Agrochemical	ZMK 110/L	Herbicide
	FarmAG Emamectin Benzoate	AIS Agrochemical	ZMK 120/L	Insecticide
	Manco 80EP	ETG	ZMK 45/500 g	Fungicide
Inoculant	Soycap	Soygro Ltd.	ZMK 40-70/bag	For 25kg soybean seed

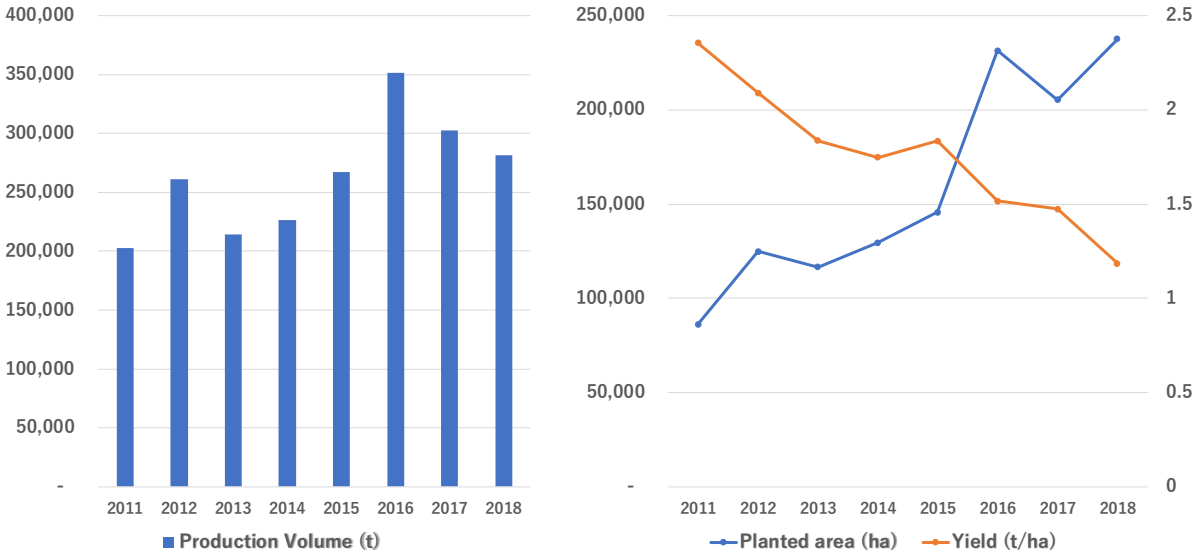
Source: The Survey Team

<sup>6</sup> Aris TRI Wahyudi, "The use of acid-aluminium tolerant Bradyrhizobium japonicum formula for soybean grown in acid soils," World Academy of Science, Engineering and Technology International Journal of Biological, Biomolecular, Agricultural, Food and Biotechnological Engineering Vol:5, No:5, 2011

6.2.3. Production

(1) Current soybean production

In recent years, soybean production in Zambia has been gradually increasing. Figure 6-3 shows soybean production, the planted area, and the average yield in the years 2011 to 2018. Despite some year-over-year variation, the production volume is generally increasing, and the production volume in 2018 is approximately 80,000 tons greater than that in 2011. It is very clear that the planted area has been increasing rapidly. The decrease in the average yield explains why production’s rate of increase is lower than the planted area’s rate of increase. The reason for the fall in the average yield is not the poor cultivation conditions in Zambia overall but rather because the average yield of the whole country is reduced by the increase in the soybean production area managed by small-scale farmers with low soybean production technology, as further explained in section (3).



**Figure 6-3: Soybean production volume (left) and planted area and average yield (right)**

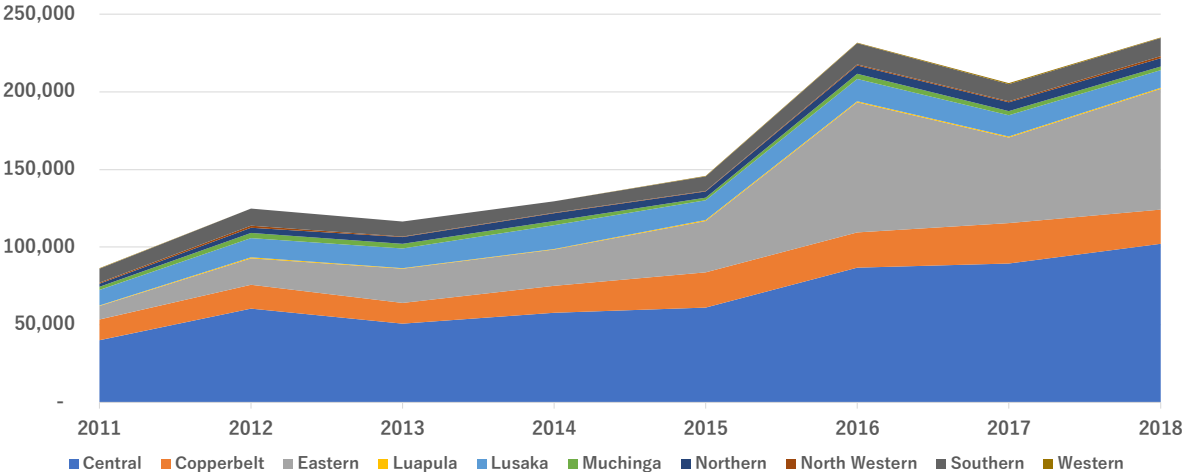
Source: Central Statistical Office, Zambia (2019)

(2) Soybean production by province

Figure 6-4 shows soybean production area trends by province for the period from 2011 to 2018. The production scale of soybeans is large in Central, Eastern, and Copperbelt Provinces, which account for 72-86% of Zambia’s total soybean cultivation area. The reasons for this trend may be that those areas have sufficient precipitation for soybean cultivation and they are located relatively close to Lusaka, which is the processing base for soybeans.

In the Central and Copperbelt Provinces, most of the soybean production area is managed by large-scale farmers, but in the Eastern Province, soybean production by small-scale producers is

more common<sup>7</sup>. According to a report of the Indaba Agricultural Policy Research Institute (IAPRI), cotton is grown actively in the Eastern Province owing to the presence of agricultural companies (Cargill, Dunavant, etc.) that operate on the contract cultivation of cotton. Currently, however, those companies promote the rotation of cotton and soybean cultivation and provide contract farmers with inputs, such as soybean seeds and fertilizers, as well as the opportunity to sell harvested soybeans back to them<sup>8</sup>.



**Figure 6-4: Soybean planted area by province (ha)**

Source: Central Statistical Office, Zambia (2019)

(3) Producers

Soybean producers are roughly divided into 1) large-scale farmers (e.g., commercial farmers, agricultural companies, etc.) and 2) small-scale farmers. According to the Central Statistical Office in Zambia, these categories are defined as follows<sup>9</sup>:

- Large-scale farmer: Production farmland area is greater than 20 ha.
- Small-scale farmer: Production farmland area is less than 20 ha.

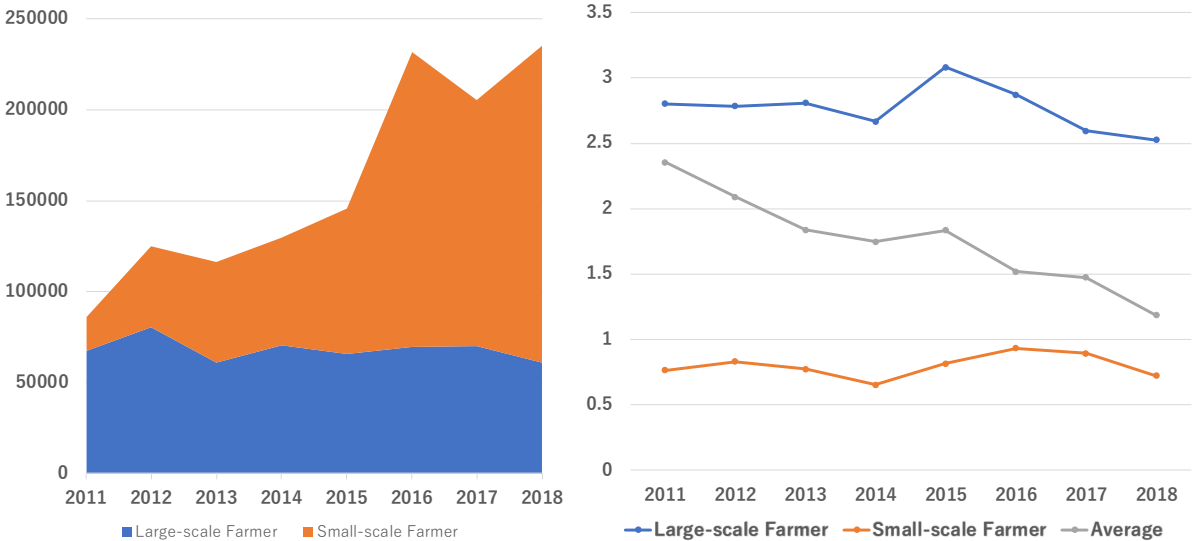
Based on this definition, trends in the soybean planted area and the average yield of each farmer category between 2011 and 2018 are shown in Figure 6-5. The graph of soybean planted area shows that the production scale of large-scale farmers is constant during this period, whereas that of small-scale farmers is rapidly increasing. The rapid increase in the soybean cultivation area of small-scale farmers may be due to 1) the increase in the demand for feed in Zambia and its neighboring countries and 2) the change in the national agricultural policy, which now encourages diversification of cultivated crops instead of focusing on maize production.

<sup>7</sup> The proportions of the production area occupied by large-scale farmers in Central, Copperbelt, and Eastern Provinces in 2018 are 30%, 64%, and 1%, respectively.

<sup>8</sup> IAPRI, 2013, Analysis of the soya bean value chain in Zambia’s Eastern Region.

<sup>9</sup> Jann Lay et al. 2018, Large-Scale Farms and Smallholders: Evidence from Zambia, Kiel Working Paper, No. 2098

The graph of the average yield of soybeans shows that the large-scale farmers’ average yield remains at 2.5-3.0 tons/ha, whereas that of small-scale farmers is 0.5-1.0 tons/ha. Generally, most of farming work is fully mechanized for large-scale farmers, allowing them to plant and harvest soybeans at the appropriate time. Furthermore, most of them use a center-pivot irrigation system. Unlike large-scale farmers, small-scale farmers often carry out much of their farming work manually and rely on rainwater-based soybean cultivation, which is apparently inefficient and unstable.



**Figure 6-5: Trends of in soybean planted area (left) and average yield (right) by farmer type**

Source: Central Statistical Office, Zambia (2019)

(4) Soybean cultivation system

Table 6-6 shows a general soybean cultivation calendar. Many small-scale farmers carry out plowing work during the dry season to prepare for the cultivation of maize and soybeans in the rainy season. Plowing work is generally carried out manually using, for example, a hoe, but some farmers conduct plowing with draft animals as well. The appropriate time for sowing soybeans is considered to be between mid-November and mid-December, when the rainy season begins. The sowing rates and intervals recommended by agricultural input material suppliers are 100 kg/ha and 40 cm × 90 cm, respectively. Farmers who have access to rhizobium inoculant attach rhizobia to the seeds before sowing and then perform the sowing work. Generally, most small-scale farmers do not add fertilizers when cultivating soybeans, but fertilizer suppliers nevertheless recommend applying about 200 kg/ha of D Compound as a base fertilizer as a standard practice. In addition, because the pH level of most Zambian soils is rather acidic, the application of about 1 to 2 tons/ha of lime or dolomite in accordance with the soil pH conditions



seems appropriate. As for pest management, most small-scale farmers do not spray pesticides or carry out other such operations, but the damage caused by soybean rust has become increasingly worrisome in recent years, and, thus, the regular spraying of fungicides seem necessary for soybean cultivation<sup>10</sup>. Harvesting work is generally performed from the end of March to the end of May, although the timing may differ depending on the soybean variety. The harvested soybeans are bagged after sun-drying and are mostly sold to aggregators. Most small-scale farmers carry out harvesting manually as well, whereas most large-scale farmers conduct all operations, including tilling, sowing, fertilization, pesticide spraying, harvesting, and post-harvest treatment, using agricultural machinery.

**Table 6-6: Soybean cultivation calendar**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation (mm)*	219	185	146	49	5	0	0	0	3	10	91	164
Land preparation												
Seed planting												
Weeding												
Pest management												
Harvesting												

Source: The Survey Team \* the WB (Tradingeconomics.com)

**Box 6.1: Interview minutes – Large-scale farmer in Serenje District, Central Province**

Interviewee: Mr. Jason Sawyer (Dyamanza Farming Limited)

Basic information: Farming activities were commenced at Luwombwa Farm Block (FB) (adjacent to Nansanga FB) in 2007. Currently, soybeans, wheat, and maize are grown mainly in Mkushi (Central Province) and Serenje. The total farmland area in Serenje is 996 ha, of which about 250–300 ha are used for soybean production.

Situation of agricultural inputs and production: Seeds, fertilizers, and pesticides are purchased directly from their respective suppliers. A soybean seed called Spike is currently applied because it has high yields under irrigation conditions. Safari seeds were planted before, but their pods were easily shattered, causing substantial harvest loss. The early shattering occurred often, especially when the pods got wet with rain. Then, the pods shattered immediately once dried. Furthermore, it was impossible to use the harvester to harvest the soybeans because the pods were too fragile against the shock of the machine. Thus, local farmers had to be hired to harvest them manually. Spike seeds have proven to be more tolerant and less prone to shattering relative to Safari seeds. Before farming activities started, the pH level of soil was acidic at about 4.7. Consequently, 4 tons/ha of lime were added to the soil in the first year, and 2 tons/ha of lime were added every year thereafter. The current soil pH is around 5.7. Experiments were conducted to show the influence of the presence of lime on the farmland’s soybean yield. The results showed that the soybean yield of the “lime-added” area was 4 tons/ha, whereas that of the area with no added lime was only 3 tons/ha. Other soybean production experiments were also conducted, but it was understood that the biggest factor affecting soybean yield was the presence of lime. Lime is purchased at a price of 50 ZMK/50 kg. All farming operations, including seeding, spraying chemicals, harvesting, and post-harvest activity, are conducted using agricultural machinery. Hence, a center-pivot irrigation system has been installed to irrigate all of the farmland.

Marketing-related practices: Soybeans are sold to aggregators. A shipping fee of 45 USD/ton (to Lusaka) is charged for each shipment. Although soybean varieties are not specified in the trading conditions, the water content of the soybeans needs to be 12% or less. The current sales price of

<sup>10</sup> Based on a discussion with IITA Zambia

soybeans is 340 USD/ton, which is not profitable. It used to be at 540 USD/ton, but soybean prices have declined since soybean exports were restricted about four years ago. Under the current farming system, soybeans must be sold at around 400-420 USD/ton to earn a profit from soybean farming.

Identified issues: In the short term, road and water difficulties are foreseen. Road conditions from Luwombwa FB to the national road are poor, making the transport of crops difficult, especially in the rainy season. Water is currently taken from wells. Although there has been no shortage of irrigation water up until now, it is unknown if irrigation can be carried out with well water until the end of the dry season given the expansion of farming lands. To address this issue, a plan is in place to construct a dam by collecting funds from other large-scale farmers in Luwombwa FB. The issue of electricity is also a long-term concern. Currently, electricity is supplied by Zambia Electricity Supply Corporation Limited, but power shortages often render the pivoting of irrigation difficult. This problem is not limited to Luwombwa FB but rather applies to all of Zambia.



Soybean production area



Dryer



Harvest and transport



Harvested soybean

**Box 6.2: Interview minutes – Small-scale farmer in Serenje District, Central Province.**

Interviewee: Mr. Irady Kalunga

Basic information: The move to the present site (Nansanga FB, Serenje District, Central Province) was made in 2011. Currently, the farm comprises 15 ha of land, 5 ha of which is used for agriculture. There are future plans to create an additional 5 ha of farmland.

Situation of agricultural inputs and production: The farm is cultivating 2 ha of maize, 2 ha of soybeans, 0.5 ha of cassava, and 0.5 ha of other beans in the current year. Rainfed agriculture is used owing to the absence of irrigation facilities. The planted soybean variety is Dina, and rhizobium inoculant is also used. The farm purchases fertilizers from Agro-dealer, but no fertilizers were used in the cultivation of soybeans. Neither pesticides nor lime were added. Maize, the staple food, is cultivated as a first priority during the rainy season, followed by soybeans, cassava, and other beans. In the current year, the delay in cultivating maize slowed the planting of soybeans. Consequently, the expected yield from soybean farming is about 0.5 tons/ha for the year. Basically, manual farming is practiced, and external help is employed when there is a shortage of labor. In general, the cost of hiring manual labor for plowing 100 m<sup>2</sup> of farmland is about 8 ZMK. Animal-drafted plowing costs 150 ZMK per 2,500 m<sup>2</sup>.

Marketing-related practices: Harvested soybeans are transported and sold to soybean aggregators in the center of the Serenje District. Sales of soybeans in the current year are carried out at the end of the harvest season. Transporters are hired when purchasing agricultural inputs or selling soybeans. The transportation cost is 100 ZMK per person (round-trip) and 10 ZMK per 50 kg of goods.

Identified issues: The difficulties faced are 1) access difficulties in general, 2) access difficulties to agricultural inputs, and 3) a lack of irrigation facilities.



Soybean cultivation



Tillage by animal draft power

#### 6.2.4. Processing

##### (1) Current situation in soybean processing

In Zambia, soybeans are processed mainly for 1) oil extraction, 2) livestock feed, and 3) food processing.

According to a report from the United States Department of Agriculture, soybean oil consumption in Zambia has been increasing in recent years, with about 49,000 tons of oil consumed in 2018<sup>11</sup>. This weight is equivalent to 272,200 tons of soybeans when using the solvent extraction method with a high oil recovery rate (about 18%), whereas it is equivalent to 376,900 tons under the compression method with a relatively low oil recovery rate (about 13%)<sup>12</sup>. Many Zambian oil millers are also livestock feed producers. Thus, in many cases, the compression method is chosen to promote the use of soybean oil for more nutritious feed. According to Global Industry, the largest soybean processing company in Zambia, Zambia's overall soybean crushing capacity is 600,000 tons/year, whereas its soybean production capacity is only 280,000 tons, which is apparently insufficient to meet demand. As a result, crude oil is imported to produce refined soybean oil.

As for livestock feed, the demand for poultry feed has been increasing drastically in recent years. According to Technoserve, the Poultry Association of Zambia reported that about 290,000 tons/year of soybeans would be necessary to secure livestock feed for their poultry farms in 2020<sup>13</sup>. Livestock feed is produced using full-fat soybean meal produced by pulverizing soybeans and low-fat soybean meal produced from the residues after oil extraction. Thus, some feed processors procure not only low-fat soybean meal from oil millers but also raw soybean materials

<sup>11</sup> United States Department of Agriculture (2019)

<sup>12</sup> Yagi T. 2006, Development trend of extraction process and degumming process for vegetable oil production

<sup>13</sup> Technoserve, 2012, Zambian Soya Value Chain: Alignment across Producers, Crushing Industry, Animal Feed Manufacturers, and Poultry Producers

to produce full-fat soybean meal. Different raw materials are used to produce various feed products. Nevertheless, the major raw materials remain maize and soybean.

Soy meat and soybean flour are the major soybean products for human consumption. Community Market for Conservation (COMACO), a social company, processes and sells a product called Yummy Soy that uses maize and soy flour as raw materials. In general, this product is dissolved in hot water and eaten as porridge. According to the Africa Center for Economic Transformation (ACET), the soybean processed food sector is expected to grow at an annual rate of 8% until 2020<sup>14</sup>.

## (2) Soybean processors

Table 6-7 shows the most common processors and major processed soybean products in Zambia.

**Table 6-7: Soybean processors in Zambia**

Name of Processor	Location	Soybean-based Products
High Protein Foods Limited	Lusaka	Soy chunks, HEP6 porridge, refined cooking oil, livestock feed
Trade Kings	Lusaka	Nyama soya, soy chicken fillet
Quality Commodities	Lusaka	Soy cake, crude oil
Seba Foods (Zambia) Ltd	Lusaka	Soy chunks
COMACO	Lundazi	Soy chunks, soymilk (Yummy Soy), soy cake
Golden Lay	Luanshya	Edible raw crude soybean oil, soy cake
Unified Chemicals	Lusaka	Refined cooking oil (Ole)
Agri Options Limited	Mkushi	Crude oil and soy cake
Gourock International	Ndola	Refined cooking oil and soap
Zamanita	Lusaka	Refined cooking oil and soy cake
Emman Farming Enterprises (EFE)	Masaiti	Refined oil, soy cake, and livestock feed
Mt. Meru	Chibombo	Refined cooking oil and soy cake
Consolidated Mining Reef Farm	Kabwe	Unrefined oil and livestock feed
Global Industries	Ndola	Refined cooking oil and soy cake
National Milling	Lusaka	Livestock feed and cooking oil
Antelope Milling	Luanshya	Livestock feed
Tiger Animal Feeds	Lusaka	Livestock feed
Novatek Animal Feeds	Lusaka	Livestock feed
Simba Milling	Lusaka	Livestock feed
Olympic Milling	Ndola	Livestock feed
Rose Breeders	Copperbelt	Livestock feed
Perfect Milling Limited	Lusaka	Livestock feed
Acropolis Enterprises Limited	Monze	Livestock feed
Chigayo Animal Feed	Choma	Livestock feed
Yielding Feeds Limited	Lusaka	Livestock feed
Pembe Milling	Lusaka	Livestock feed
Namfeed	Lusaka	Livestock feed

Source: Modified based on IAPRI, 2014, Soybean value chain and market analysis

<sup>14</sup> ACET, 2013, The Soybean Agri-Processing Opportunity in Africa

**Box 6.3: Interview minutes - Global Industries (Soybean processors in Copperbelt province)**

Interviewee: Mr. Paradeept

Global Industries began its soybean oil extraction business in 2010. The company owns the soybean crusher with the highest processing capacity in Zambia (360,000 tons/year). Zambia's overall soybean crushing capacity is approximately 600,000 tons/year. Soybean production in Zambia is only about 283,000 tons per year, which is not sufficient to meet demand. For this reason, soybean crude oil was imported from overseas, namely, from Malaysia, when the business was started. With the eventual interdiction of handling genetically modified varieties in Zambia, Ukraine became the only source of imported raw soybeans.

The company has purchased soybeans directly from farmers since the beginning of its oil extraction business. These soybeans can be bought from essentially any farmer as long as they meet the specifications set by the company. For example, the company divides soybean quality into three grades: A, B, and C. Soybeans of A or B quality can be accepted for purchase, whereas those of C quality are not accepted. At present, raw materials for producing refined soybean oil are sourced via domestic and overseas crude oil procurement in a ratio of approximately 5:5. However, given a desire to increase the domestic procurement ratio of soybeans, the company has invested in Luswhish FB for soybean production. Currently, the farm management of Luswhish FB is outsourced to Olympic Milling, which has more experience producing soybeans than Global Industries has.



Soybean processing factory



Advertisement for calling producers to sell their soybean

#### 6.2.5. Distribution

##### (1) Current situation of soybean distribution

In general, soybeans harvested by small-scale farmers are dried, packed in harvest bags (50 kg), and sold to aggregators. In fact, Zambia's aggregators differ in terms of their carrying capacity and the territories that they cover. According to a survey conducted by IAPRI in the Eastern province, about 60% of small-scale farmers sold soybeans to small-scale aggregators (middleman), about 20% sold them to large-scale aggregators (i.e., wholesalers or major soybean processors), and about 10% sold them to retailers in local markets. The middlemen are responsible for purchasing and collecting soybeans from soybean producers in rural areas as agents for wholesalers and soybean processors. The reason that many small-scale farmers choose to sell soybeans to middlemen is probably that these farmers do not have a reasonable method of transporting their products to large-scale aggregators. Wholesalers and major soybean processors generally establish soybean purchasing points in the center of each district to inspect and pay for soybeans directly delivered by farmers. In recent years, the number of soybean purchasers has

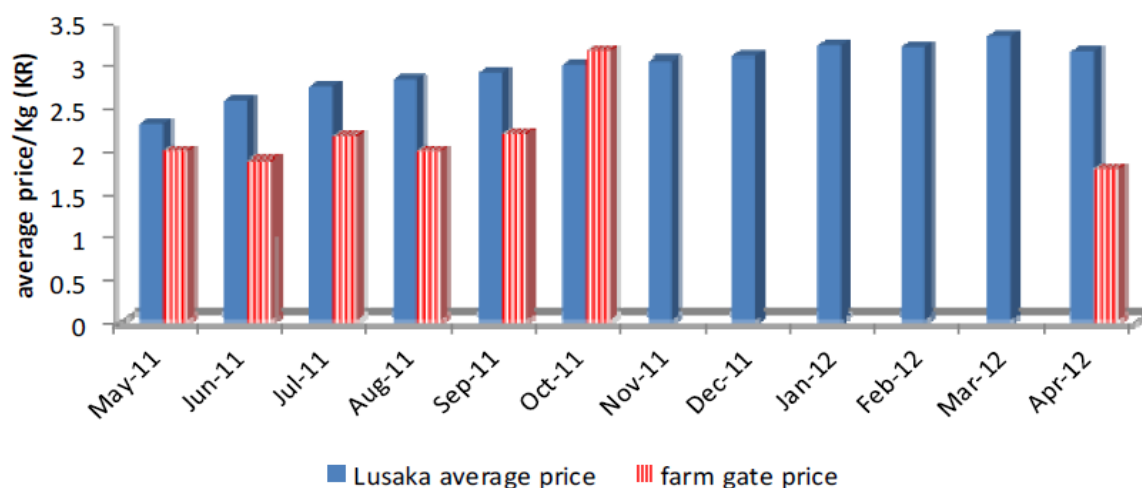
increased. Many wholesalers and soybean processors have been observed setting up soybean purchasing points in the center of the Serenje District in Central Province. Signboards indicating buying prices are displayed in front of each purchasing point to attract farmers selling their beans. The soybeans collected at the soybean purchase point are then loaded onto a large truck and transported to each customer or soybean processing factory. On the contrary, more trading conditions are imposed on transactions between large-scale farmers and soybean buyers. For example, whether the wholesaler or producer is responsible for transporting soybeans is often negotiated between the two parties.

## (2) Market price and distribution cost of soybean

Figure 6-6 shows soybean prices in Lusaka market in 2012 and the soybean farm gate price charged by small-scale farmers in the Eastern Province<sup>15</sup>. The market price of soybean is at its lowest in May, when the distribution of new beans begins. The price then gradually increases until the next soybean harvest. The farm gate price of soybeans is about 60–90% of the market price in Lusaka except in October. The difference between the market and farm gate prices is regarded as the commission earned by the aggregators (middlemen and wholesalers). The cost of transporting soybeans to Lusaka is estimated to be around 0.56 ZMK/kg according a large-scale farmer in the Serenje District. Assuming that the market price in Lusaka is 4,000 ZMK/ton and that 20% of the market price is the amount that small-scale farmers pay to aggregators, the transport cost for small-scale farmers can be estimated to be around 0.80 ZMK/kg. This cost is 40% greater than that paid by large-scale farmers. Other factors that increase the transportation costs of soybeans for small-scale farmers include the high risks taken by aggregators and the inefficiency of compiling small-lot transactions. According to an IAPRI report, some small-scale farmers intentionally mix sand and low-quality shrunken and molded soybeans into their harvest bags, resulting in increased inspections and demands for compensation by aggregators. Consequently, relatively lower purchasing prices are proposed by soybean aggregators to compensate for the risks taken.

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<sup>15</sup> IAPRI, 2013, Analysis of the Soya Bean Value Chain in Zambia's Eastern Province. However, according to soybean aggregators in Serenje District, Central Province, the current soybean purchasing price is in the range of approximately ZMK 2.7–4.2/kg.



**Figure 6-6: Soybean market price in Lusaka in 2012 and the farm gate price charged by small-scale farmers**

Source: IAPRI, 2013, Analysis of the Soya Bean Value Chain in Zambia's Eastern Province

**Box 6.4: Interview minutes - Steab B Carriers company**

As of June 6, 2019, the price of soybeans was 4 ZMK/kg. Soybean prices vary depending on supply and demand conditions. When the purchase price is low, it is around 2.7 ZMK/kg. The price of soybeans is determined by the headquarters with reference to the competitive purchase price and is transmitted to each purchasing point each day. The major customers of Steab B Carrier company are Mount Meru Millers, Novatek, and Zamanita. Purchased soybeans are transported directly to these companies depending on the instructions given by the headquarters. When buying soybeans, Steab B Carrier company does not go the farmer's field to collect them. Instead, the farmers generally transport the harvested soybeans to the purchasing point set up by the company. Soybean inspections are carried out before purchase, and poor-quality beans (shrunken or moldy beans) are rejected. Transporting soybeans from Serenje to Lusaka takes about two days considering the interdiction of night travelling in Zambia. Escalating prices due to foreign aggregators from DRC and Tanzania purchasing beans at a higher price than the market price in Zambia has proven to be a recent challenge in the industry. Although the export of soybeans is prohibited in Zambia, inefficient border control has failed to stop illegal soybean smuggling between Zambia and DRC.



Signboards showing the soybean buying price

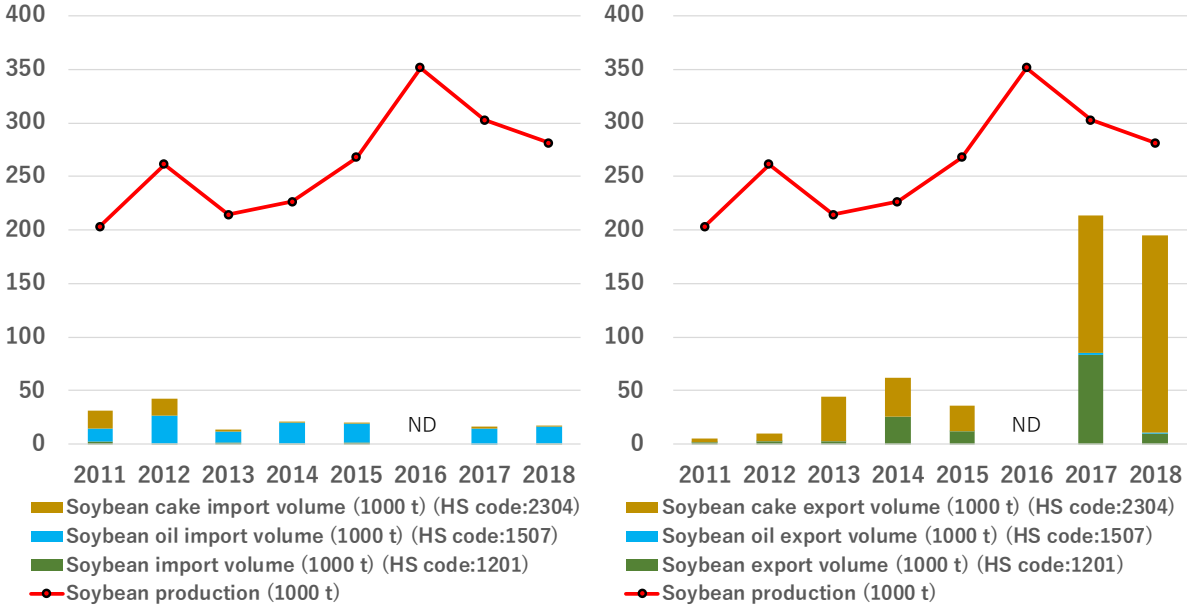
(3) Logistics infrastructure

Most soybeans are distributed by large trucks. The main roads connecting the soybean collection bases in the provinces to the Copperbelt and Lusaka provinces, where most soy processors are concentrated, are well paved and in good condition. Conversely, many of the connecting roads between rural areas and the soybean collection bases, which are often situated in the center of each district, are unpaved, causing many transport hazards during the rainy season. According to Technoserve reports, the logistics cost in Zambia is about 11.64 USD per ton for

every 100 km. This cost is even higher than that of South Africa, where it is estimated to be about 6.5 USD per ton for every 100 km<sup>16</sup>.

6.2.6. Imports, exports, and the domestic market

Figure 6-7 shows changes in the imports and exports of each soybean item from 2011 to 2018. Approximately 20,000–30,000 tons of soybean oil (including crude and refined oil) are imported each year, but this volume tends to decrease as the soybean production volume increases. Major exporters of soybean oil to Zambia include South Africa, Mauritius, and Singapore. In contrast, the export volume of soybean meal has increased drastically. About 80,000 tons of soybeans were exported in 2017, whereas the total in 2018 was only about 10,000 tons. The major soybean export destinations are Zimbabwe, South Africa, and Botswana, whereas the major export destinations for soybean meal are Zimbabwe, South Africa, and Kenya.



**Figure 6-7: Import (left) and export volume (right) of soybean products**

Source: UN Comtrade (2019)

6.2.7. Policies and the role of the government

(1) National Agriculture Policy (2012-2030)

The National Agriculture Policy enacted in 2011 defines the development vision as “A competitive and diversified agricultural sector driven by equitable and sustainable agricultural development.” Hence, the mission to be achieved by agriculture sector, “To facilitate the development of a competitive, diversified, equitable and sustainable agriculture sector,” is set

<sup>16</sup> Technoserve, 2011, Southern Africa Soy Roadmap – South Africa value chain analysis



by the policy. Additionally, the agricultural sector has following development objectives.

- 1) Promote a sustainable increase in the agricultural productivity of major crops with comparative advantage;
- 2) Continuously improve the agricultural input and product markets to reduce the marketing costs of agribusiness, including among small-scale farmers and farmers' groups;
- 3) Increase agricultural exports to preferred markets at the regional and international levels;
- 4) Improve access to productive resources and services for small-scale farmers, especially women and young farmers, in outlying areas to enable them to increase their production of staple foods, including fruits and vegetables, for their own consumption and for income generation;
- 5) Continuously strengthen public and private sector institutional capabilities to improve agricultural policy implementation, resource mobilization, agriculture research, technology dissemination, and the implementation of regulatory services.

The policy related to soybeans includes “Promoting expansion of production of oil seed crops (soybean, sunflower, groundnuts) in rotation with food grains as a way to reduce fertilizer costs on the one hand and increase farm yield, incomes and consumption of protein rich food crops on the other” as a sub-objective of objective 1) mentioned above. A similar sub-objective is also listed for development objective 4)<sup>17</sup>.

## (2) Farmer Input Support Program (FISP)

The FISP was established by the Government of Zambia in 2002 to improve small-scale farmers' access to agricultural inputs. At the beginning of this program, maize seeds and fertilizers procured by the government were distributed to cooperatives and individual farmers approved by the Provincial Agriculture Coordinating Office (PACO). Very soon, problems, such as increasing operation costs, inappropriate identified beneficiaries, and delays in the distribution of inputs, led the authorities to establish a full-scale E-Voucher system in 2017. The E-voucher system is highly appreciated by all participants, and small-scale farmers can procure the necessary farming inputs within a given amount. Nevertheless, as of 2019, some farming areas have yet to benefit from the FISP E-voucher system., namely, in zones with poor communication facilities. Hence, the direct conventional distribution method is still used in these areas. In Serenje District of Central Province, the operation of the E-voucher system began in 2017, but the direct distribution method was re-employed in 2018 owing to the poor communication environment. Maize seeds and fertilizers are directly distributed as a single package, and the distribution of a new soybean package, including soybean seeds and fertilizers, has been added

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<sup>17</sup> Ministry of Agriculture and Co-Operatives, 2011, The National Agriculture Policy 2012-2030

to the program as of 2015<sup>18</sup>. Figure 6-8 shows a list of materials distributed through the FISP.

**RE: AUTHORITY TO COLLECT (ATC)**

I wish to confirm that the following farmers in **Mailo Scheme Camp, Serenje District** are authorised to collect the following inputs for this ATC towards the Farmer Input Support Programme (FISP) for the **2018/2019** agricultural season.

**INPUT PACKS SUMMARY**

#	INPUT PACK NAME	PACK DESCRIPTION	NO OF PACKS
1	Maize_Pack	3 Bags (150 kg) Urea, 3 Bags (150 kgs) D-Compound and 10 Kg Maize Seed	13
2	Soya_Beans_Pack	2 bags (100 kgs) D-Compound and 50 Kg Soya-beans seed	13

**Figure 6-8: List of materials distributed through the FISP (direct distribution method)**

Source: Selenge District official

### (3) Import and export control of soybean products

The Agribusiness and Marketing Department of the Ministry of Agriculture is responsible for the import and export control of soybeans. Import and Export Licenses for agricultural goods are compulsory and are issued by the above department, which is also represented in the provinces. Table 6-8 outlines the procedures required to obtain a license. As an example, exporting soybeans to Japan would involve applying for a license from the Agribusiness Marketing Department or its provincial office by providing such items as the export destination and export volume. Plant quarantine inspection certificates from ZARI are also required simultaneously. The inspection items should also correspond to those required by the Japanese authorities. Once approved, the inspection certificate is submitted with all required documents and accompanied by the payment of 52.5 ZMK per 30 tons of export, as legal fees, to the Agribusiness Marketing Department. Licenses are issued within 24 hours upon the submission of completed requests, and the export operation must be completed within 30 days of obtaining the license.

**Table 6-8: Procedure for obtaining import and export licenses**

Step	Procedure
1 <sup>st</sup> Step	Collection of the import/export application form from Agribusiness & Marketing Department permit office number G7 at Mulungushi House Lusaka or the District Agricultural Coordinators' Offices in Sesheke, Livingstone, Kapiri Mposhi, Ndola, Solwedi, Mpulungu, Mbala, and Chipata
2 <sup>nd</sup> Step	Collection of the relevant certificate <b>- Animal &amp; fish products – Organization in charge: Veterinary Department</b> Imports: Permit-Importation of Livestock Products and Fish Products. Exports: International Sanitary Certificate <b>- Plant products and seeds – Organization in charge: Zambia Agricultural Research Institute and/or the Seed Control &amp; Certification Institute in Mt. Makalu</b> Imports: Plant Import Permit Certificate (for seeds, include Notice to Import Seed)

<sup>18</sup> Based on an interview with PACO staff in Central Province.

	Exports: Phyto-sanitary Certificate and Seed Certificate for Seed
3 <sup>rd</sup> Step	The completed documents highlighted above must then be submitted to the Agribusiness & Marketing Department (Import & Export Permit Office)
4 <sup>th</sup> Step	Permits are ready for collection 24 hours after the submission of completed document and are subject to the payment of a statutory fee of 52.50 ZMK per minimum load of 30 metric tons. The permit is valid for only 30 days after issuance.

Source: Ministry of Agriculture, Zambia

In recent years, the Zambian government has restricted exports of raw soybeans. This interdiction was likely to have started in 2015 according to interviews with government officials and workers in private sectors related to the soybean business. The motive for this particular interdiction was a reaction to the strong demand from domestic soybean processors. Prior to this regulation, soybean processors could procure raw soybeans in Zambia, but when the borders were opened for soybean trade, the number of foreign soybean buyers also increased, escalating the domestic market prices of soybeans and soybean processing. This situation made it difficult for soybean processors to procure raw soybeans. Thus, when the export control measures were taken, soybean market prices declined because foreign soybean consumers were shut off from the market. According to an interview with the person in charge at the Agribusiness and Marketing Department of the Ministry of Agriculture, the representatives of producers and soybean processors hold annual stakeholders' meetings to determine the allowable export volume of soybeans based on estimated annual soybean production. The Zambia government then controls the soybean export volume with respect to the estimates provided by stakeholders. The exportable volume in 2019 is estimated to be limited to around 10,000 tons owing to poor expected soybean production. As mentioned earlier, the Agribusiness and Marketing Department is in charge of issuing export licenses for agricultural products, which explains the need to clearly indicate the amount of soybeans to be exported when obtaining a license. The export prohibition measures are taken when the cumulative volume of soybean exports exceeds the allowed volume.

#### 6.2.8. Issues and opportunities

##### (1) Issues

As mentioned earlier, the increasing importance of soybeans in Zambia has led to an increase in domestic demand, namely for extracted oil, livestock feed, and produced soybean foods, such as soy meat. However, domestic soybean production has not been able to satisfy this vigorous demand, and the Zambian government has had to restrict exports to prioritize domestic demand, which mainly comes from the domestic soybean processing industry. To meet the growing demand for soybeans, it is necessary to increase soybean production in Zambia. However, the scale of large-scale soybean production has not increased for the last ten years despite having attained a high average yield. Thus, a future challenge is to consider improving the productivity

of small-scale farmers. The issues needing attention are 1) soybean production and distribution by small-scale farmers and 2) exporting Zambian soybeans to Japan, as described below.

1) Issues related to soybean production and distribution by small-scale farmers

- ✓ Access to agricultural inputs that can be used for soybean cultivation seems difficult. This issue is particularly important in rural areas, where the high transportation cost is a major financial hindrance to directly delivering farming inputs to small-scale farmers if the E-voucher system is not available. Where such access is possible, soybean seeds and fertilizers (i.e., D Compound) are distributed directly to the relevant farmers. The distribution of fertilizers containing components such as lime and dolomite would be better for these farmers, as most farmlands in Zambia have acidic soil (the proper pH for soybean growth is around 6.0–6.5).
- ✓ Many small-scale farmers have low productivities, as most farm work is done manually. Nevertheless, farmers tend to expand their cultivation areas extensively, often resulting in poor farming management and limited yield. Many farmers also tend to prioritize maize cultivation for self-consumption to the point of ignoring proper soybean cultivation management in some cases. Few farmers have access to helpers for farm work. Although several providers of custom work services exist, only a limited number of farmers have access to these services.
- ✓ Soybean production in Zambia is generally dominated by large-scale farmers. Many small-scale farmers have limited soybean farming skills, experience, and knowledge of basic cultivation techniques and fertilizer management. Agricultural technical guidance and dissemination activities should be organized to improve sowing techniques, fertilization management, pest management, and post-harvest treatment.
- ✓ Joint efforts for transporting farming products between cooperatives are rather rare in Zambia. Most small-scale transactions are carried out directly between individual farmers and aggregators in rural areas. The relationship between these two parties is often not very stable or reliable, likely encouraging mutual suspicion and increasing overall distribution costs to compensate for unforeseen risks.

2) Issues related to Zambian soybean exports to Japan

- ✓ Soybean exports are currently restricted by the Government of Zambia, discouraging many foreign buyers from counting on Zambia as a stable and reliable source of this crop. In short, soybean production needs to be increased to address this problem. Nevertheless, the business feasibility of carrying out soybean trade with Zambia needs to be studied carefully by Japanese companies, especially in terms of pricing, because of 1) the high

soybean demand from neighboring countries to Zambia, which may lead the market price to rise and 2) the high costs of soybean production in Zambia owing to critical imports of fertilizers and pesticides.

- ✓ Large-scale farmers, who lead soybean production in Zambia, prefer varieties that have higher yields, are resistant to shattering, and are disease resistant. However, because no white-eyed soybeans currently possess these characteristics, planting white-eyed soybeans, such as Safari, is risky for large-scale farmers. Thus, reasonable incentives are required to promote the cultivation of white-eyed soybeans. According to the IITA, the new white-eyed soybean developed by the IITA is superior to Safari in terms of disease resistance. The new variety is expected to be released and made available nationwide soon.
- ✓ Currently, the variety and aesthetic appearance of soybeans are considered less important in the soybean trade in Zambia. Contamination by different varieties can be prevented when traders can procure specific soybeans from large-scale farmers. However, the chance of procuring a variety of soybeans instead of specifically white-eye beans is often considered higher when dealing with small-scale farmers.
- ✓ The traceability mechanism under the current soybean distribution method seems rather weak. Limiting the source of supply to large-scale farmers could help to build a traceable supply chain from producers to consumers, but it may require discouraging small-scale farmers' participation in the supply chain.
- ✓ The presence of aflatoxin may be a major hindrance to the development of the soybean trade between Zambia and Japan. If aflatoxins are detected at a plant quarantine station in Japan, the permission to import will not be granted, causing much damage to the purchasers' image. This type of mold poison can be prevented if soybeans are properly stored and their water content is controlled. As of now, small-scale farmers lack the techniques and facilities to store soybeans properly.

## (2) SWOT analysis

Table 6-9 shows the results of SWOT analysis regarding soybeans in Zambia. Given the favorable natural conditions suitable for soybean production and the government's strong support, such as through the FISP, it seems feasible to increase soybean production to satisfy the vigorous demand for soybeans from the domestic and international markets. In addition, it is necessary to increase the soybean productivity of small-scale farmers by expanding custom work services. An increase in soybean production will also ease the government's restrictions on soybean exports and removing these restrictions will improve the competitiveness of Zambian soybeans in the international market.

**Table 6-9: SWOT analysis results for the soybean VC**

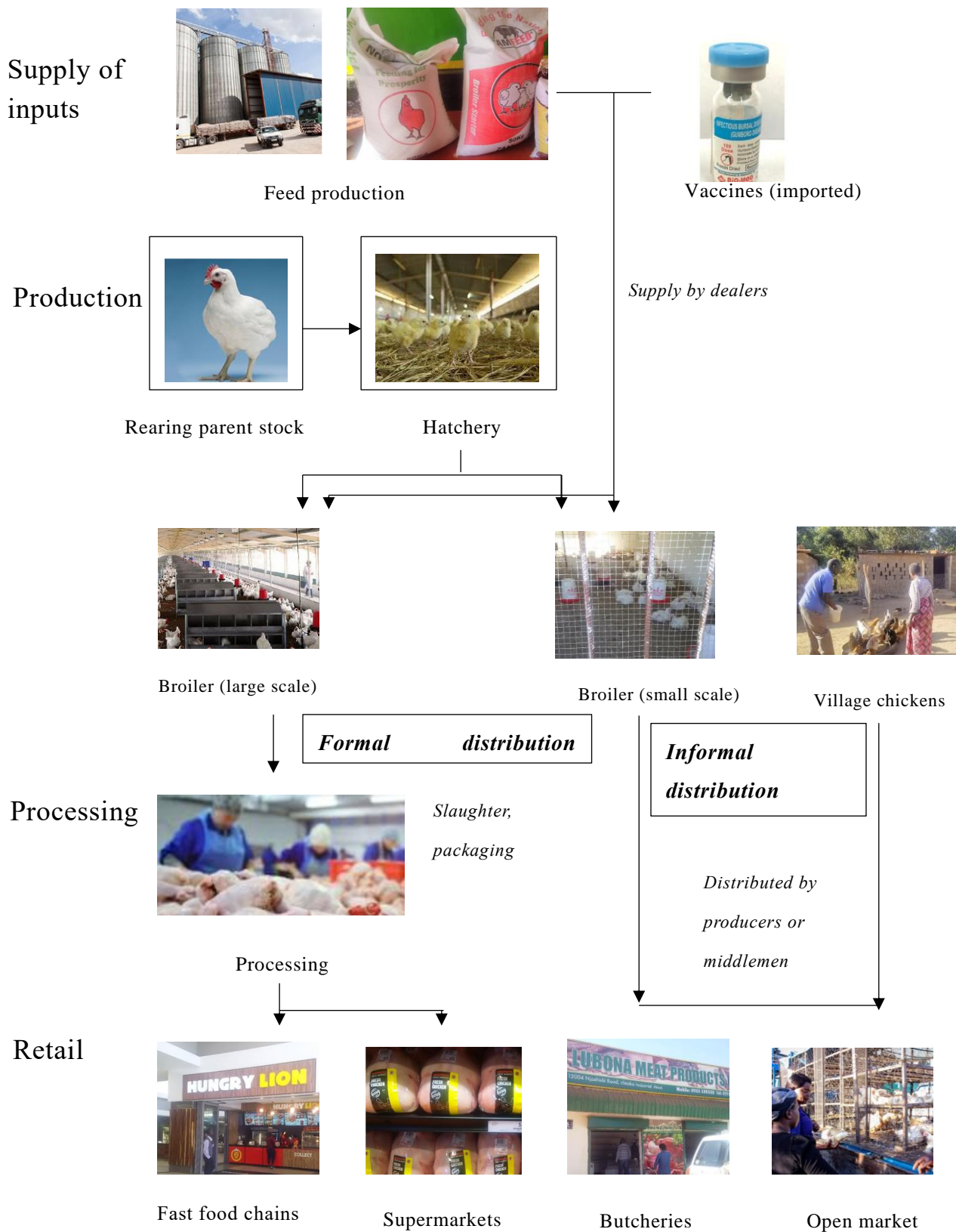
<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>● Flat lands are vast. Thus, there is room to expand the soybean cultivation area, and agricultural machinery is easy to use.</li> <li>● Small-scale farmers can obtain agricultural inputs through the FISP.</li> <li>● Large-scale farmers have very high soybean production capacities.</li> <li>● Breeding and research of soybean varieties are more advanced than in neighboring countries.</li> <li>● Non-genetically modified soybean production is the highest among neighboring countries.</li> <li>● Rhizobium materials are distributed throughout the country.</li> <li>● There are many soybean processors (i.e., oil extraction, feed production, and food processing) in the country, and its processing capacity is high.</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>● The soil pH of domestic farmland is acidic. Soybeans are not suitable for cultivation on acidic soil.</li> <li>● The farming operations of small-scale farmers are hardly mechanized, and work efficiency is poor. Service providers of custom work are limited in Zambia.</li> <li>● Small-scale farmers' soybean production and post-harvest technology levels are low and need to be improved.</li> <li>● Many soybean producers depend on rainfed water.</li> <li>● Because most agricultural imports are imported, their prices are higher than in neighboring countries.</li> <li>● In many areas, the farm roads and bridges leading to markets from rural areas are poor. In addition, inefficient agricultural product distribution increases transportation costs.</li> <li>● Traceability is lacking. Risk is high for soybean consumers who place importance on traceability.</li> <li>● Financial access is limited. The interest rate offered by commercial banks is very high.</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>● Demand for soybean-related products from Japan and overseas have increased.</li> <li>● Demand for non-GMO varieties of soybeans is growing.</li> <li>● The soy food sector shows a high growth rate.</li> <li>● White-eyed soybeans, such as Safari, may have demand from the Japanese market.</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>● Rainfall is unstable (climate change impact)</li> <li>● The government places regulations on soybean exports, reducing international competitiveness</li> </ul>

Source: The Survey Team

### 6.3. Chicken Meat VC

#### 6.3.1. Overview

Figure 6-9 shows an overview of the chicken meat VC in Zambia. As the figure indicates, the chicken meat VC includes the processes of input supply, production (i.e., rearing parent stock, hatchery, and rearing broiler and village chickens), processing, distribution, and retail. A variety of firms specialize in one process of the VC, and some large integrators engage in more than two processes of the VC. Appendix 2 provides an overview of the VCs of three largest chicken meat integrators (Hybrid Poultry, Ross Chicken, and Zamchicken) in Zambia.



**Figure 6-9: Overview of the chicken meat VC in Zambia**

Source: The Survey Team

### 6.3.2. Agricultural Inputs

The most important input for the chicken meat VC is chicken feed. Table 6-10 shows the cost structure of broiler production for Zambia and South Africa, indicating that feed costs comprise 60–70% of the total cost of broiler production.

**Table 6-10: Production cost structure per broiler (USD)**

	Zambia				South Africa			
	2012	Component ratio	2015	Component ratio	2012	Component ratio	2015	Component ratio
Feed	1.74	61%	1.16	60%	1.61	73%	1.08	64%
Day-old chicks	0.85	30%	0.52	27%	0.37	17%	0.38	22%
Others	0.25	9%	0.25	13%	0.24	11%	0.24	14%
Total cost	2.84	100%	1.93	100%	2.22	100%	1.70	100%

Source: Development Southern Africa, Analysis of the animal feed to poultry value chain in Zambia (2018)

The ingredients of chicken feed are soybean cake, maize, and premixes<sup>19</sup>. Although the maize for feed is produced domestically, all of the premixes are imported, mainly from South Africa and Tanzania<sup>20</sup>.

Table 6-11 shows historic trends in the production volume of animal feed and its price. The price decreased between 2009 and 2015 owing to the increase in production. However, the production volume of feed has been decreasing since then owing to Zambia’s economic downturn. Furthermore, the price of feed has trended upward with substantial fluctuation (see Appendix 3) owing to fluctuations in the prices of premixes caused by changes in exchange rates, a decrease in the supply of maize due to a decrease in its market price, and an increase in the price of soybean cakes since 2018 (see Appendix 4)<sup>21</sup>.

Table 6-11 indicates that chicken production costs are higher in Zambia than in South Africa, and the major reasons for this difference are the high costs of feed and day-old chicks (DOC). To counteract these high costs, Agricultural Research Station (a public research institution) is conducting research on ways to lower the costs of animal feed, such as substituting cassava for maize as a main ingredient<sup>22 23 24</sup>.

<sup>19</sup> In some cases, rape cake or peanut cake is used instead of soybean cake.

<sup>20</sup> The value of the imported materials constitutes about 15–20% of the total feed price.

<sup>21</sup> Based on an interview with the Poultry Association of Zambia.

<sup>22</sup> Because maize is a major ingredient in chicken feed (about 50%), chicken feed’s price is higher than those of feeds for other animals.

<sup>23</sup> Based on an interview with the Ministry of Agriculture and Livestock.

<sup>24</sup> The major reason for the higher price of DOCs in Zambia than in South Africa is Zambia’s relatively small scale of DOC production (based on an interview with the Poultry Association of Zambia).



**Table 6-11: Production volumes and prices of animal feed over time**

	Production <sup>25</sup> (1,000 MT)	Price per kg (USD)
2009	N/A	0.69
2010	171.4	0.60
2011	222.3	0.50
2012	310.0	0.58
2013	372.4	Unknown
2014	372.3	Unknown
2015	Unknown	0.39
2016	300.0 (Estimate)	0.62

Source: Development Southern Africa, Analysis of the animal feed to poultry value chain in Zambia (2018), UNCTAD, Competition dynamics and regional trade flows in the poultry sector (2014)

Most of the chicken feed produced in Zambia is used domestically, and only 3% of it is exported<sup>26</sup>. Zambia has eight major animal feed makers<sup>27</sup>, and, among them, only Novatek has ISO 22000 certification<sup>28</sup>.

All vaccines and medicines for chickens are imported, and, thus, their prices change as the exchange rate fluctuates.

### 6.3.3. Production

The chicken production process can be divided into rearing parent stock, hatchery, and chicken rearing, and many producers specialize in one of these production processes<sup>29</sup>. Figure 6-10 shows historical trends in the production volumes of chicken and DOCs. Both of these production volumes have increased significantly in the last 20 years.

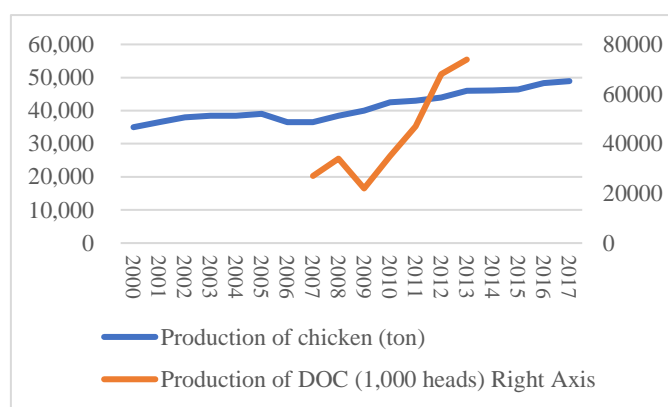
<sup>25</sup> Zambia's total feed production capacity was 450,000 MT in 2016 (World Bank, Jobs in value chains Zambia, 2017).

<sup>26</sup> Feed is mostly exported to Democratic Republic of Congo (based on an interview with the Poultry Association).

<sup>27</sup> The feed makers are National Milling Corporation, Novatek Animal Feeds, Tiger Animal Feeds, Nutrifeds, Pembe Milling, Simba Milling, Olympic Milling, and Emmanns Feed Enterprises.

<sup>28</sup> Analysis of the animal feed to poultry value chain in Zambia, WIDER Working Paper (2018).

<sup>29</sup> Integrators of chicken meat are engaged in more than two processes of the VC.



**Figure 6-10: Production volumes of chicken and DOCs in Zambia**

Source: FAOSTAT, UNCTAD, Competition dynamics and regional trade flows in the poultry sector (2014)

(1) Rearing parent stock

Parent stock refers to the parent chickens of broilers, and these chickens are reared for 400 days, which is nine times longer than broilers are reared. At present, only Hybrid Poultry and Ross Breeders Zambia rear the parent stock of broilers in Zambia. Hybrid Poultry rears the Cobb breed, and Ross Breeders Zambia rears the Ross breed; these breeds are the two major broiler breeds in Zambia. The Ross (originated in Scotland) and Cobb (originated in the USA) breeds are popular broiler breeds worldwide and are characterized by their large appetites and short time to become an adult chicken.

1) Hatchery

Hatchery is the process producing of DOCs from parent stock. Zambia has seven major hatchery firms<sup>30</sup>. Most of the DOCs produced in the country are sold domestically; only 2% of them are exported<sup>31</sup>.

2) Chicken rearing

a) Rearing of broilers

A broiler is a chicken that is reared for six weeks after it is hatched from an egg. There are estimated to be about 300,000 broiler farms with various scales of production in Zambia. About 65%–70% of all broiler chickens are produced by small-scale broiler farmers who rear fewer than 10,000 chickens<sup>32 33</sup>.

Many middle- and larger-scale broiler farmers are out-growers of chickens who have formal contracts with large-scale processing firms.

The minimum scale of production required by processing firms for out-growers is 15,000

<sup>30</sup> These seven firms are Hybrid Poultry, Zamhatch, Tiger Chicks, Ross Breeders, Quantum Foods, Panda Hatcheries, and Chipata Hatcheries.

<sup>31</sup> Based on an interview with the Poultry Association of Zambia.

<sup>32</sup> World Bank, Jobs in value chains Zambia, 2017

<sup>33</sup> Zambia has about 300 large-scale broiler producers who rear more than 20,000 chickens (based on an interview with Poultry Association of Zambia).

chickens. In some cases, however, smaller-scale farmers collectively sign contracts with processing firms as out-growers. Chicken meat integrators, such as Hybrid Chicken and Zamchick, provide out-growers with most of their inputs, such as feed, DOCs, vaccines, and technical services, and out-growers only supply facilities and labor for their broiler production<sup>34</sup>.

One of the major issues in chicken rearing is the spread of disease. In particular, infectious bursal disease and New Castle disease spread frequently, and the financial damages of the broiler farmers affected by these diseases are quite severe. Nevertheless, the spread of disease is limited to small areas, and no large-scale, rampant disease has occurred<sup>35</sup>. Broiler farms generally vaccinate their chickens, but farmers have difficulty accessing vaccines for purchase in some rural areas<sup>37</sup>.

#### b) Rearing of village chickens

Quite a few farmers in Zambia rear local chickens (usually called village chickens). These local chickens are mostly reared in open fields and are not given any feeding management or vaccinations.

#### 6.3.4. Processing

Almost all of the chickens reared by out-growers and large-scale broiler farms are shipped to the major processing firms and are processed (which includes slaughtering, washing, cutting, and packaging) at their factories<sup>38</sup>. Processed chicken products includes packed chicken meats, which are sold at supermarkets; chicken products, which are used at fast food and restaurant chains; and high value-added products, such as chicken sausages.

At the factories of these processing firms, antibiotic residue checks are performed regularly by the staff of the Ministry of Agriculture and Livestock. Additionally, some restaurant chains, such as KFC and Hungry Lion, perform their own hygiene checks at the factories that they commission to process their products. Among chicken meat processing factories, only the Verino factory, which is located in a suburb of Lusaka, holds ISO 22000 certification. Additionally, Kaizen practices are used at the Verino factory<sup>39</sup>.

In 2015, the volume of chicken processed by these processing firms was 2,125 MT, which was only a small portion of the chickens produced in Zambia. Much of the chicken produced in

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<sup>34</sup> Zamchick procures 70% of its volume of chicken from out-growers, and Hybrid Poultry procures 50% of its total volume from out-growers.

<sup>35</sup> The margin of an out-grower was USD 0.5 per chicken at the time of the survey (based on an interview with an out-grower in Refunza District).

<sup>36</sup> Based on interviews with the Poultry Association of Zambia and Hybrid Poultry.

<sup>37</sup> Based on interviews with the Ministry of Agriculture and Livestock and some broiler farmers.

<sup>38</sup> The processing firms include Zamchick, Verino (a joint venture of Hybrid Poultry and Verino Agro-Industry), Crest Chicken, Southern Chicken, Supreme Chicken, and Copperbelt Chicken.

<sup>39</sup> Kaizen practices are exercised under the guidance of an Indian consultant.

Zambia, including broilers reared by medium- and small-scale farmers and village chickens, are processed at butcheries, restaurants, and hotels through informal distribution channels.

### 6.3.5. Distribution

As discussed above, the minimum scale of broiler production required to be an out-grower is 150,000 chickens, and chicken farmers with smaller production scales have no access to formal distribution channels. Accordingly, they sell their products through informal distribution channels that are composed of middlemen, small-scale butcheries, and open markets. Another major issue facing medium and small-scale chicken producers is a lack of access to a cold chain, such as refrigerators or refrigerated vans, which hinders them from shipping their products in a timely way based on market conditions<sup>40</sup>. In contrast, most of the chickens produced by large-scale farmers are sold to major processing firms through formal distribution channels.

### 6.3.6. Imports, exports, and the domestic market

According to the Poultry Association of Zambia, the volume of informal chicken exports from Zambia to the Democratic Republic of Congo, which is not shown in the formal statistics, is estimated to be about 20% of Zambia’s total chicken production. Moreover, some of the major processing firms, such as Hybrid Poultry and Zamchick, export their chicken products to neighboring countries, including the Democratic Republic of Congo, Angola, and Mozambique.

As shown in Table 6-12, the volume of chicken imported to Zambia has increased since 2010, and chicken producers in Zambia must compete with producers in South Africa and Brazil, which have better price competitiveness in international markets. However, imports of chicken meat and chicken products to Zambia have been banned since 2018<sup>41</sup>.

**Table 6-12: Volumes of chicken imported to and exported from Zambia (tons)**

Year	Imports of chicken	Exports of chicken
2010	558	8
2011	967	50
2012	1,606	33
2013	1,522	15
2014	4,427	7
2015	7,088	17
2016	9,606	0

Source: FAOSTAT

<sup>40</sup> The rearing of mature chickens increases feed costs for producers.

<sup>41</sup> However, imports of mechanically separated meat (mainly offal for processing use) is not banned, and its import volume has been increasing. Some claim that these imports are one factor in the lower price of chicken meat in Zambia (based on an interview with Hybrid Poultry).

About 50% of Zambia's total meat consumption is chicken meat, and the total volume and per capita volume of chicken meat consumption have been increasing over the last 20 years<sup>42</sup>. Major reasons for this increase in consumption are the increase in per capita income and urbanization. However, annual per capita consumption of chicken meat is still about 6 kg, and per capita income and urbanization are expected to grow, meaning that the domestic consumption volume of chicken is also forecasted to increase in the future<sup>43</sup>. Furthermore, the sales volume of chicken meat through formal distribution channels, which include supermarkets and restaurant chains, is estimated to increase in the future as income levels and urbanization increase.

Consumers in Zambia generally prefer village chicken, which is relatively chewy, to broiler chicken, and its retail price is higher than that of broiler chicken<sup>44</sup>.

#### 6.3.7. Policies and the role of the government

The production of antibiotic-free poultry is stipulated by the Ministry of Agriculture and Livestock, and the ministry regularly conducts antibiotic residue checks at food processing factories. Additionally, food processing firms are requested to abide by the following standards:

- Implementation of environmental assessments based on the standards of the Environmental Management Agency
- Zambia Bureau of Standards
- Certification granted by the Ministry of Agriculture and Livestock in the case of exports or imports of food products.

In addition to these standards, in some cases, processing firms must abide by the hygiene or environmental standards set by their provincial and district governments, and some firms claim that the related regulations and standards are quite complex<sup>45</sup>.

Additionally, extension officers from the Ministry of Agriculture and Livestock provide technical assistance in hygiene and feeding management and chicken production facilities, mainly to small-scale farmers. However, the Ministry has only a small number of extension officers, meaning that the beneficiaries of these extension services are quite limited<sup>46</sup>.

The Ministry of Agriculture and Livestock provides financial support for the vaccination of large animals as a countermeasure to diseases, but it does not cover vaccinations of small animals, including chickens.

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<sup>42</sup> The annual growth rate of per capita consumption of chicken meat was about 20% between 2010 and 2014. However, it is about 5% at present (based on an interview with Hybrid Poultry).

<sup>43</sup> Based on interviews with the Poultry Association of Zambia, Hybrid Poultry, and processing firms.

<sup>44</sup> The retail price of broiler chicken at the open market in Solwezi city is ZMK 50 per chicken, and that of village chicken is ZMK 70-90. However, the farm gate prices of both types of chicken are almost the same (based on an interview with shop owners at the Solwezi open market).

<sup>45</sup> Based on an interview with the Poultry Association of Zambia.

<sup>46</sup> Based on interviews with the Poultry Association of Zambia and small-scale broiler farmers.

6.3.8. Issues and opportunities

Table 6-13 shows the results of the SWOT analysis of the chicken meat VC. The chicken meat sector as a whole is expected to grow in the future, as the demand for chicken meat is estimated to increase and Zambia has strong production capacity. However, the high price of feed due to fluctuations in the maize supply and the price of premixes and the resulting low competitiveness of Zambian chicken are the major problems facing the sector. For small- and medium-scale producers, the lack of access to cold chains and formal distribution channels are the major issues. For large-scale processors, the fact that they offer only a few high value-added products, such as chicken sausage and fried chicken, is a major issue.

In addition, village chickens are very popular among consumers, but their farm gate prices are not very high, and their benefits are not captured by producers.

**Table 6-13: SWOT analysis results for the chicken meat VC**

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>● Growing numbers of restaurants, fast food chain stores, and supermarkets.</li> <li>● Existence of large-scale integrators.</li> <li>● Strong production capacity at each level of the VC, that is, the supply of inputs, the rearing of parent stock, hatchery, broiler production, and processing.</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>● High price of feed.</li> <li>● Huge economic loss from the prevalence of disease.</li> <li>● No access to cold chains for small- and medium-scale producers.</li> <li>● No linkages of small-scale producers to formal distribution channels.</li> <li>● Limited varieties of value-added products.</li> <li>● Low competitiveness of chicken and chicken products in the international market.</li> <li>● Complex related regulations and standards.</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>● Increasing demand in the domestic market and neighboring countries.</li> <li>● Popularity of village chicken.</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>● Fluctuation in the supply of maize.</li> <li>● Increases in the price of soybean cake.</li> <li>● Influence of the exchange rate on the price of premix.</li> <li>● Increase in imports of mechanically separated meat.</li> </ul>

Source: The Survey Team

**6.4. Cultured Fish VC**

6.4.1. Overview

Figure 6-11 shows an overview of the cultured fish VC in Zambia. The main inputs for aquaculture are fingerlings and fish feed, almost all of which are domestically produced. The major cultured fish species is the bream, particularly tilapia, which is popularly cultured throughout Zambia. The production methods fall into two categories: pond culture and cage culture. Some cultured fish are frozen and distributed to urban areas through cold chains established by major players in the VC. However, the cold chain infrastructure is not very well established in Zambia, so most fish are sold fresh at open markets on the same day that they are

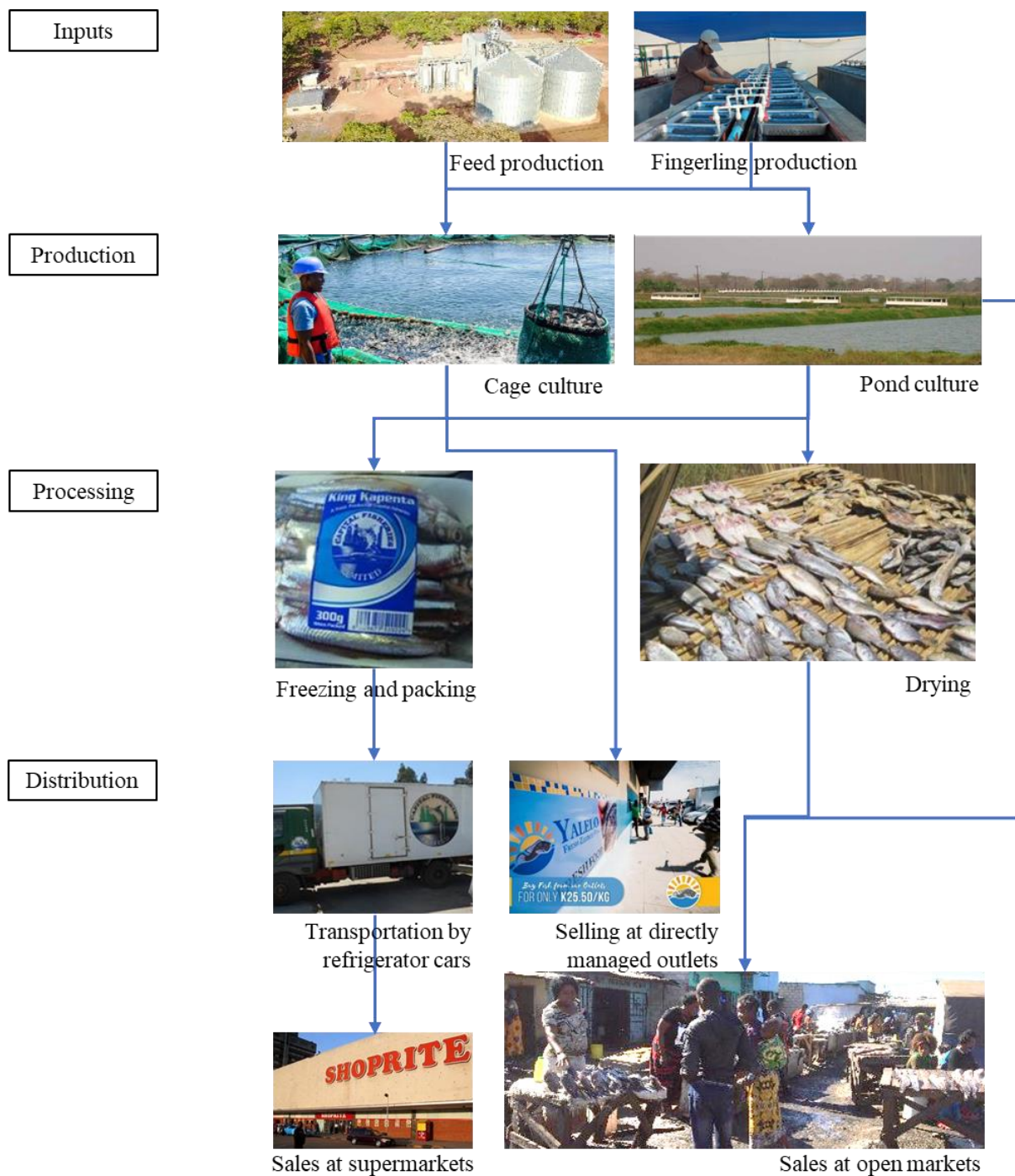
harvested or are dried and sold throughout Zambia.

Table 6-14 shows changes in the price of fish at each step of the VC. Captured fish are less expensive than cultured fish because the former category includes small fishes whose prices are much lower than that of tilapia, whereas almost all cultured fish is tilapia. Both captured and cultured fishes are dried by processors.

**Table 6-14: Average fish prices in Zambia**

Category	Harbor/pond ZMK/kg	Wholesale price ZMK/kg	Retail price ZMK/kg
<b>Captured fish</b>			
Fresh fish	8.00 - 15.00	15.00 - 20.00	22.00 - 35.00
Dried fish	10.00 - 25.00	25.00 - 30.00	30.00 - 50.00
<b>Cultured fish</b>			
Fresh fish	18.00 - 23.00	22.00 - 25.00	25.00 - 45.00

Source: 2017 Annual report, Department of Fisheries, Ministry of Fisheries and Livestock (MOFL)



**Figure 6-11: Overview of the cultured fish VC in Zambia**

Source: The Survey Team

#### 6.4.2. Agricultural inputs

The two major inputs for aquaculture in Zambia are (1) fingerlings and (2) fish feed. Both are described below.

##### (1) Fingerlings

- 1) Species



The bream is the major species of cultured fish in Zambia, and cyprinid (carp) and silurid fish (catfish) are also produced in small amounts. Cultured fish are limited to indigenous species. For example, the genera of Tilapia, Oreochromis, Serranochromis, and so on are cultured and generally known as tilapia fish.

## 2) Fish farmers and production areas

Almost all fingerlings are produced in Zambia by private hatcheries and hatcheries operated by the MOFL. As an exception, some fish farmers located around Lake Kariba, where aquaculture is thriving, import fingerlings from Zimbabwe owing to an insufficient supply of fingerlings. A private hatchery must have a certificate issued by the Zambia Bureau of Standards to produce and sell fingerlings. Many domestically produced fingerlings are mixed sex, but some private hatcheries produce male sex-reversed fingerlings by supplying hormone treated feed, as male fingerlings grow faster and larger. The demand for fingerlings is greater than the supply, meaning that fish farmers may have to wait for two to three months after placing an order. Msekese Fisheries, which recycles water with a quality filtration system, reports that it is producing 150,000 fingerlings/month in 2019 and will increase production to 400,000 fingerlings/month in 2020. The price is 0.5ZMK/fingerling, which is an average price in Zambia, and the minimum transaction volume is 100 fingerlings.

Many private hatcheries are located in Southern Province, where aquaculture is thriving, and Lusaka Province, where the Department of Fisheries, MOFL is located. Fingerlings are sensitive to changes in water temperature and vibrations and, thus, should be supplied within the vicinity of a hatchery. Msekese Fisheries transport their fingerlings by refrigerated truck, and sometimes it can take three hours to travel 60 kilometers. Some other major hatcheries are Chirundu Bream Farm Hatchery and Palabana Fisheries, both of which are located in Chirundu<sup>47</sup> in Southern Province.

Fingerling production in rural areas is mainly handled by facilities under MOFL. However, these facilities cannot appropriately meet the demand of fish farmers, as the fingerlings are mixed-sex, and some of them have ceased operations. Currently, MOFL has 20 facilities for fingerling production, and seven of them do not produce fingerlings, as the budget for maintaining the facilities is insufficient<sup>48</sup> and newly established facilities are not ready for production.

## (2) Fish feed

### 1) Production

Fish feed is broadly divided into two types: commercially mass-produced fish feed and feed

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<sup>47</sup> Around 90 km from Kariba.

<sup>48</sup> A hatchery in Lundazi District, Eastern Province has stopped production owing to a broken pump system.

that small-scale fish farmers make for themselves or the use of residues. In this survey, the former type of feed is the target of study and analysis.

Fish feed can be categorized into three groups: starter, grower, and finisher. Generally, starter contains more protein and oil, and finisher has less of those nutrients. As a result, the prices of starter, grower, and finisher are ranked in that order, as shown in Table 6-15. The cost of feed accounts for 60–70% of production costs in commercial fish farming<sup>49</sup>.

**Table 6-15: Price of fish feed in Zambia**

Type of fish feed	Price (ZMK/50kg bag)
Starter	280–320
Grower	160–180
Finisher	140–150

Source: Fisheries Statistics Annual Report (2015), MOFL

In addition to locally made fish feed, imported feed is also used by fish farmers. In the past, all quality feed was imported, but quality local feed is also available now, as modernized fish feed mills have recently been established by several manufacturers. Zambia has eight major fish feed producers, and some of them<sup>50</sup> even export feed to neighboring countries, such as Uganda, Malawi, and Tanzania.

Some fish feed makers are planning to increase production, as the demand for fish feed is increasing. For example, a global fish feed producer with its headquarters in Denmark, Allo Aqua, constructed a modern factory near Lake Kariba, the most popular place for cage culture in Zambia, and started production in 2017. Its production capacity is 50,000 MT/year, and it has room to double its production capacity. Some other major fish feed makers are Kafue Fisheries, which produces various types of livestock feed, including fish feed; Skretting Zambia, whose headquarters are located in Norway; Novatek Animal Feeds under Zambeef group; National Milling Company; and Tiger Feed. These feed makers sell their products directly to fish farmers, and fish farmers need to manage the transportation of fish feed by themselves or by hiring trucks. Thus, access to quality fish feed is difficult for small fish farmers in rural areas. As an exception, Novatek Animal Feeds provides delivery services of fish feed to Zambeef’s direct outlets located throughout Zambia. Thus, this company has many small-scale fish farmers as its customers. In other cases, some small-scale fish farmers form cooperatives, purchase fish feed in bulk, and distribute small amounts of feed to each member.

<sup>49</sup> Small-scale fish farmers have insufficient capital, and their aquaculture is partially subsistence. They cannot afford to buy commercial feed but instead rely on self-produced feed or residues, and, thus, their cost of feed is a small fraction of production costs.

<sup>50</sup> Including Allo Aqua, as will be discussed later

## 2) Materials

The major components of fish feed are soymeal (30–40%), soybean oil (about 8%), maize (about 50%), and others (fishmeal, fishbone, minerals, and preservatives). “Others” are imported materials, but maize and soybeans, which comprise most of the components of fish feed, are locally produced. The production volume and price of maize are relatively stable. However, soybean production fell owing to a shortage of rainfall in 2018, resulting in a high price of soymeal; thus, Allo Aqua added the increase in the price of soymeal onto its selling price<sup>51</sup>. As low rainfall also occurred in 2019, a soymeal shortage may occur again the year. Given this circumstance, the Zambian government is permitting the import of non-genetically modified soymeal from India in 2019. The cost of soymeal accounts for the highest portion of total production costs, followed by the costs of electricity and labor for operating mills.

### 6.4.3. Production

Aquaculture in Zambia can be largely divided into (1) cage culture and (2) pond culture, but another method between capture fisheries and aquaculture exists called (3) culture-based fishery, which increases fish resources by stocking fingerlings into bodies of water for capture fishery. The production estimates in 2017, shown in Table 6-16, indicate that cage culture produces around 70% of all cultured fish.

**Table 6-16: Production estimates by aquaculture system in 2017**

System	No. of farmers/farms/dams	No. of ponds/cages/dams	Volume (m <sup>3</sup> )/area (ha)	No. of production cycles/year	Total fish produced	Composition ratio (%)
Small-scale ponds	21,429	37,555	692.46	1.5	4,258.59	12.9%
Large-scale ponds	26	-	280	1.5	2,982.00	9.1%
Culture-based fisheries	-	1,082	5,410	1	2,705.00	8.2%
Water-based (cages)	17	129	269,912	1.7	22,942.52	69.8%
Total					32,888.11	100.0%

Source: 2017 Annual report, Department of Fisheries, MOFL

Through either cage or pond culture, fish farmers produce or procure fingerlings, raise fish to table size (around 300 g) for five to six months, and then sell them. The time to raise fish varies depending on quality of the feed and the volume of feed consumed, which increases under high water temperatures and decreases under low water temperatures.

<sup>51</sup> Allo Aqua did not have an insufficient supply of soymeal in 2018.

(1) Cage culture

1) As shown in Figure 6-12, cage culture is popularly carried out in Lake Kariba in Southern Province and is also conducted in Lake Tanganyika in Northern Province and Lake Mweru and Lake Bangweulu in Luapula Province to some extent. Cage culture started in 1995 in Lake Kariba, but it was suspended owing to a lack of environmental law to control cage culture. It was restarted in 2008 after the development of the relevant legal system. Production has rapidly increased and accounted for around 70% of cultured fish in 2017. Currently, three large-scale fish farms and ten small- and medium-scale fish farmers operate cage culture in Lake Kariba.



**Figure 6-12: Lakes where cage culture is implemented**

Source: The Survey Team, developed based on the 2014 Fisheries Statistics Annual Report, Department of Fisheries, MOFL

2) Facilities and equipment

Two cage sizes are used, as shown in Table 6-17. The MOFL does not recommend using a cage smaller than 6 m in cubic size.

**Table 6-17: Size, capacity, price, and production of aquaculture cages in Zambia**

Size	Production capacity (MT)	Price (ZMK)	Production place
Cylindrical shape, diameter 20 m x height 6–9 m	30–45	300,000	Assembled from imported materials by fish farmers
Cubic shape, 6 m x 6 m x 6 m	5–7	85,000	Fabricated in Zambia

Source: Siavonga Aquaculture Research Station, Department of Fisheries, MOFL

Several kinds of synthetic fiber nets are used in cage culture, as follows. The nets are replaced approximately every five years even if they are properly maintained. The use of type B) or C) depends on the size of the fish.

- |  |
|--|
| <ul style="list-style-type: none"> <li>A) Bird net: protection from birds, placed above the water surface</li> <li>B) Fingerling net: for fingerlings, placed inside D)</li> <li>C) Production net: for production, placed inside D)</li> <li>D) Predator net: protects fish from predators, placed on outer side of cage</li> </ul> |
|--|

Because the recommended cage placement is where a lake reaches a depth of 20 to 30 meters<sup>52</sup>, a boat is necessary for cage culture. Wooden and metal boats are produced in Zambia, but boats made of fiberglass and engines are imported.

**Box 6.5: Large-scale cage culture in Lake Kariba by Yalelo**

Yalelo was founded in 2011 in Zambia and produces tilapia through large-scale cage culture in Lake Kariba. It has developed such facilities as 36 hatchery ponds, 24 nursery cages<sup>53</sup>, 58 production cages, 43 directly operating outlets, and a cold chain throughout Zambia. It raises fingerlings to the size of 250 to 300 grams for six months, and its fish production is as high as 1,000 MT/month. The temperature around Lake Kariba is higher than in other areas of Zambia, so fish can grow consistently throughout the year<sup>54</sup>. Yalelo is not only the most advanced fish farmer from the perspective of hygiene control with antiseptic solution at many points in production sites, the safety management of employees, and efficient production, but it is also the largest inland fish culture company in Africa. It exports fish in addition to providing domestic supply, and its domestic and regional markets are both expanding. Thus, it intends to increase its production capacity. One of its challenges is securing quality human resources, as its location is far from Lusaka (three hours by car) and is even distant from the nearest town, Siavonga.

This size of production has a huge potential impact on the environment, and, thus, Yalelo operates in line with EIAs by, for example, choosing appropriate cage locations and treating effluent from hatchery ponds. It has built a primary school and provides adult education for local residents to fulfill its cooperate social responsibility.

(2) Pond culture

1) Outline

As shown in Table 6-16, fish farmers engaging in pond culture outnumber those engaging in cage culture. However, most of them are small-scale fish farmers, and their contributions account for only around 13% of production volume. The average pond size of small-scale fish farmers can be derived from the data in Table 6-16 as 0.018 ha (e.g., 10 m x 18 m). This size is much smaller than the average pond size of members of the Zambian Aquaculture Co-operative Society Ltd (ZACOSO) of 0.24 ha. Thus, small-scale fish farmers carry out aquaculture at an extremely small scale. According to the MOFL<sup>55</sup>, around half of small-scale fish farmers are located in Northern and North Western Provinces. Table 6-16 shows that large-scale pond fish farmers account for 9% of total production. The MOFL collected information from 20 large-scale pond fish farmers in 2014<sup>56</sup> and found that the pond area per farmer ranges from 6 ha to 72 ha, which is much larger than that of small-scale pond fish farmers.

<sup>52</sup> “Strategic Environmental Assessment (SEA) for cage fish culture sites in Lake Kariba – Siavonga District” 2011, MOFL

<sup>53</sup> Diameter 20 m x height 6 m.

<sup>54</sup> The low water temperatures at high altitudes during June to July drive fish to eat less, resulting in slow growth. Thus, if fish are produced over this period, production may take seven to eight months.

<sup>55</sup> Fisheries Statistics Annual Report 2014

<sup>56</sup> Same as above.

## 2) Facilities and equipment

Ponds are the major facility for pond culture and comprise most of the initial investment costs. Ponds can be dug by excavators or by hand, but excavators are rare among small-scale fish farmers owing to insufficient capital. ZACOSO has asked several development partners (DPs) to provide excavators so that the association can provide pond construction services to its members. Next to pond construction, investments to make water available are costly and important. The main water sources are rivers and groundwater. Compared to these initial investments, the production costs, including feed, fingerlings, electricity for pump operations, and labor salaries, are smaller. Thus, the production capacity is determined by a fish farmer's capital, which limits the size of the pond.

## (3) Culture-based fisheries

Fish reproduce often and increase their numbers in artificial bodies of water, such as irrigation dams. Local residents carry out capture fishery in such water bodies, and, thus, the MOFL stocks fingerlings in these bodies of water to maintain and develop fishery resources.

### 6.4.4. Processing

#### (1) Outline

The most popular fish processing methods are drying and fumigation. Fresh fish are also cleaned as part of the process of distributing fish through the cold chain, although these fish are a small portion of all cultured fish. Fish are not typically filleted, as Zambians like to eat whole fish, including the head. The processing mentioned here is applied to both captured and cultured fish.

#### (2) Drying and fumigation

The drying and fumigation of fish is widely adopted throughout Zambia to preserve and distribute fish over longer periods of time<sup>57</sup>, as cold chain infrastructure is not established in the country. Drying and fumigation are carried out by fish farmers, middlemen, and retailers as a side job. Women also engage in processing activities, which provide them with an important source of income for women in particular. Prior to drying and fumigation, some types of fish must be opened and cleaned. As several processes are required, the price of dried fish is high. For example, 1 kg of fresh tilapia bought for ZMK 25 from an outlet of a large-scale fish farmer can be sold for ZMK 75 after drying and fumigation, according to the MOFL. In general, ordinary fish processors can dry 20 kg of fish at one time.

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<sup>57</sup> According to fresh fish retailers at open markets in Kanyama and by Lake Kariba, fresh fish must be sold within the same day of purchase even if they are kept on ice.

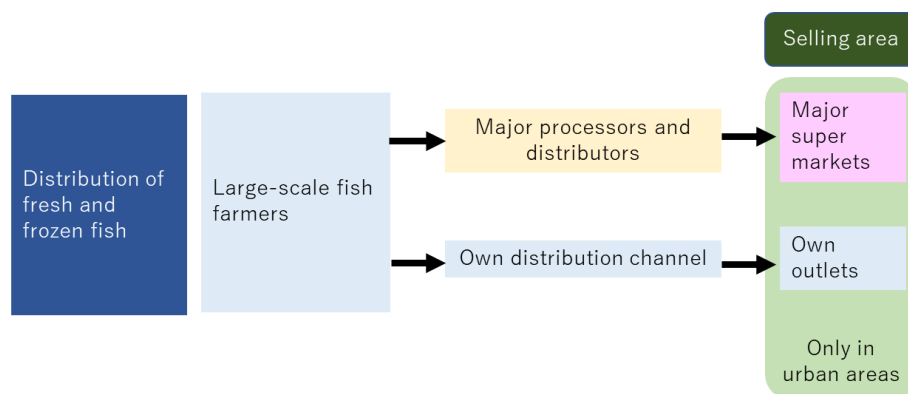
### (3) Cleaning and freezing of fish

Frozen fish are sold at major supermarkets and direct outlets operated by major fish farmers. Some of them are scaled, and their inner parts are removed before they are frozen. Fish cleaning is performed only by Capital Fisheries, which is the largest fish importer, processor, and distributor in Zambia, and large-scale fish farmers, such as Yalelo.

#### 6.4.5. Distribution

##### (1) Distribution through the cold chain

Cold chain infrastructure is not yet established in Zambia, so fresh or frozen fish can be distributed only through cold chains developed by the major fish processors and distributors, supermarkets, and fish farmers. As shown in Figure 6-13, the cold chain has been developed by major players in the cultured fish VC, and only urban consumers have access to fish distributed through the cold chain.

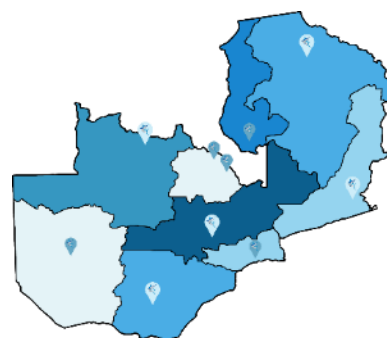


**Figure 6-13: Distribution of fish through the cold chain in Zambia**

Source: The Survey Team

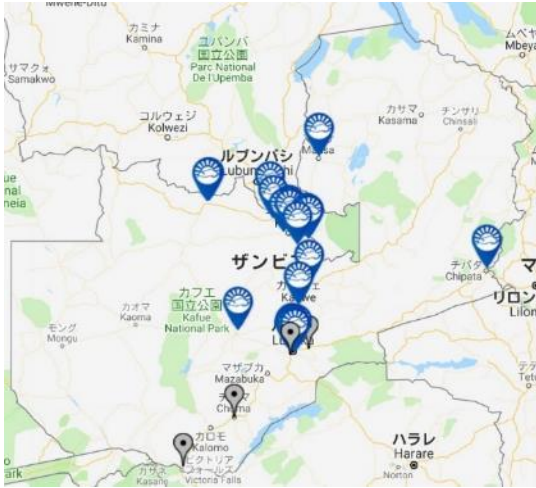
Figure 6-14 shows the locations of ten depots established by Capital Fisheries. It has developed its own cold chain and distributes frozen fish throughout Zambia.

Yalelo, a major fish farm, sells frozen fish at 43 outlets that it operates directly. As shown in Figure 6-15 and Figure 6-16, these outlets are mainly located on the route from Lusaka to Solwezi in Northern Province through Kabwe in Central Province and Ndola in Copperbelt Province. The figures show that the outlets are placed in densely populated areas.



**Figure 6-14: Locations of Capital Fisheries depots**

Source : <http://www.capfish.com/>



**Figure 6-15: Locations of Yalelo outlets throughout Zambia**

Source : <https://www.yalelo.com/>



**Figure 6-16: Locations of Yalelo outlets in Lusaka and its suburbs**

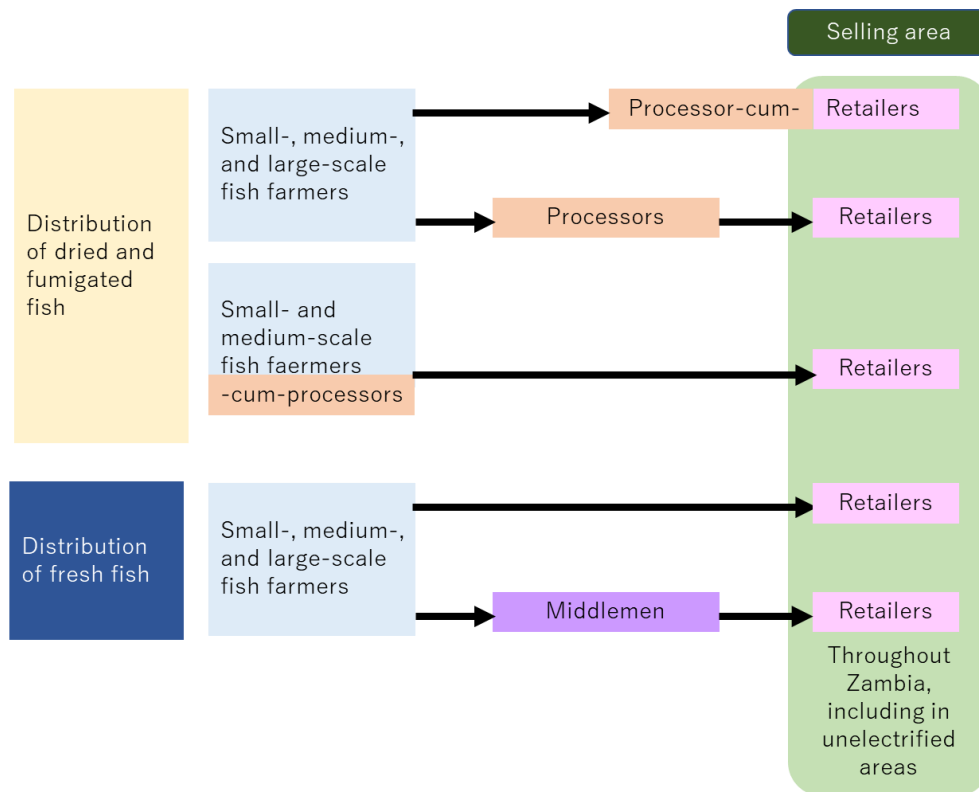
Source : <https://www.yalelo.com/>

(2) Distribution not using a cold chain

As mentioned in (1), cold chain infrastructure has not yet been established in Zambia. Fresh fish are delivered on ice occasionally and are rarely kept on ice at local open markets. Thus, retailers basically sell all fish on the same day as it is purchased at markets that are not equipped with cold storage.

Because dried and fumigated fish can be stored and distributed without a cold chain, they are sold throughout Zambia, including in unelectrified areas. Demand for dried and fumigated fish is high in urban areas, and both dried and fresh fish are sold at Kanyama Fish Market, the largest fish market in Zambia. Figure 6-17 shows the distribution flow of dried and fumigated fish .





**Figure 6-17: Distribution of fish outside of a cold chain in Zambia**

Source: The Survey Team

(3) Sales at fish markets

The amount of traded fish in selected markets according to the MOFL is shown in Figure 6-18. The statistics include both captured and cultured fish.

**Table 6-18: Fish market statistics in 2015 in Zambia**

Province	Fresh fish trading				Dried fish trading			
	Weight (kg)	Value (ZMK)	No. of traders	Average price/kg	Weight (kg)	Value (ZMK)	No. of traders	Average price/kg
Central	224,027	2,675,797	2,249	12.00	344,882	39,688,204	2,459	25.00
Luapula	ND	ND	ND	12.45	ND	ND	ND	10.61
Lusaka	ND	ND	ND	24.00	ND	ND	ND	43.00
Muchinga	ND	ND		26.00	ND	ND	ND	19.00
Northern	10,000	539,930	140	ND	8,840	25,540	357	ND
Western	11,715	234,300	1,269	25.00	20,673	516,825	1,906	31.00
<b>Total</b>	<b>245,742</b>	<b>3,450,027</b>	<b>3,658</b>		<b>374,395</b>	<b>40,230,569</b>	<b>4,722</b>	

Source: 2015 Fisheries Statistics Annual Report, MOFL

Note: Data were not available in Copperbelt, Eastern, North Western, and Southern Provinces.

As Figure 6-18 shows, more dried fish is traded than fresh fish. The weight of traded dried fish is 1.5 times greater than that of traded fresh fish, and value of traded dried fish is twelve times

greater than that of traded fresh fish. Dried fish dominates fish trading in parts of Zambia where the cold chain has not been established. As Box 6.6 mentions, proper facilities for storing and displaying fish are not available in open markets.

**Box 6.6: Fish market in Kanyama**

An open fish market is located in Kanyama, which is a 40 minute-drive from Lusaka. It is regarded as the largest open fish market in Zambia, and it is operated by an association mainly consisting of members of the Patriotic Front, the ruling party of Zambia. Around 400 traders are registered, and they pay 2 ZMK per day (if they pay on Monday, Wednesday and Friday, they are allowed to trade for one whole week). The market has no proper facility for preserving and displaying fresh fish, and, thus, traders need to sell their fish within the same day of procurement. One fish trader buys 100 kg of fresh fish and sells all of it on the same day. She said that the purchasing price of fresh fish is trending upward. Some other fish dealers buy and sell dried fish.

6.4.6. Imports, exports, and the domestic market

(1) Imports and exports

The volumes of fish imported to and exported from Zambia are shown in Figure 6-18, Figure 6-19, and Figure 6-20.

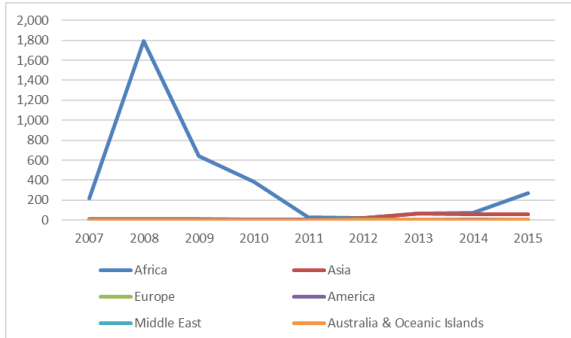


Figure 6-18: Exports of fish from Zambia

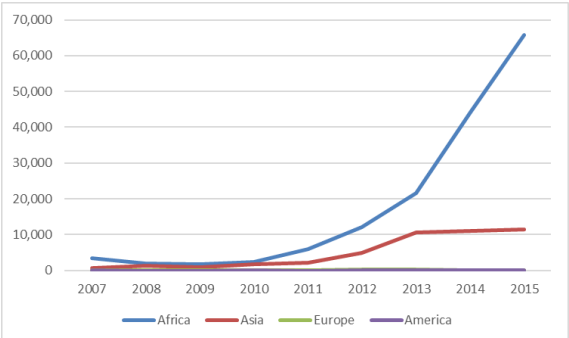


Figure 6-19: Fish imports from each region to Zambia

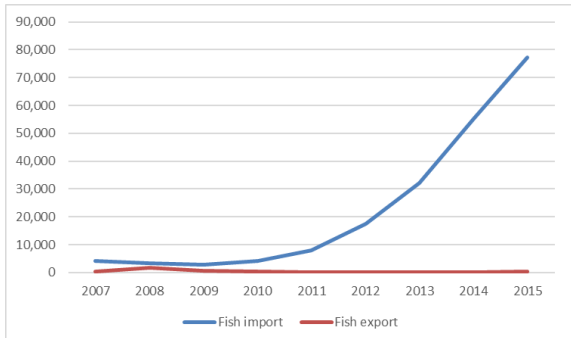


Figure 6-20: Total fish imports to Zambia

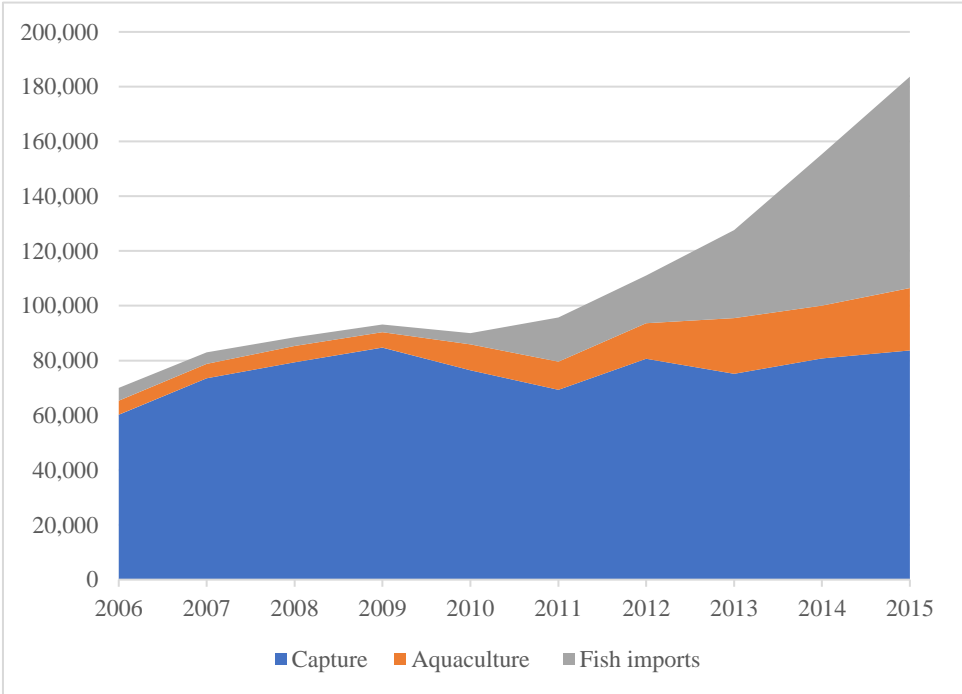
Source for Figure 6-18, Figure 6-19, and Figure 6-20: 2015 Fisheries Statistics Annual Report, MOFL

According to the 2015 Fisheries Statistics Annual Report, MOFL, Zambia imported 77,199.2 MT and exported 334.3 MT in 2015, showing that imports are much greater than exports. Major destinations of exported fish are African countries, such as the Democratic Republic of Congo and Angola showing high demand of fish in this region. The demand for fish in the southern

region of Africa is regarded as high. The major origins of Zambia’s imported fish are also African countries, and small horse mackerel from Angola<sup>58</sup> comprises most of the imported fish. Other imported fish include cultured fish from Zimbabwe, captured sea fish from South Africa, and cultured tilapia from China and Thailand.

(2) Domestic market

The volume of domestically distributed fish in Zambia is shown in Figure 6-21. The volume of fish consumption has been increasing rapidly since 2011. The volumes of captured and cultured fish have gradually increased, and most of increased consumption volume is taken up by imported fish. Cultured fish accounted for 12.4% of the total consumption volume in 2015.



**Figure 6-21: Fish consumption in Zambia in 2015**

Source: 2015 Fisheries Statistics Annual Report, Department of Fisheries, MOFL

Fish consumption per capita in Zambia is shown in Figure 6-22. The consumption volume in 2015 was double that of 2011. The rapid increase of consumption began in 2011, and this trend matches that of the volume of imported fish shown in Figure 6-20. This finding implies that the increase in imported fish contributed to Zambia’s increase in per capita fish consumption. As described in (1) above, most imported fish are small and inexpensive<sup>59</sup> horse mackerel from

<sup>58</sup> Horse mackerel imported from China are exported from Angola to Zambia.  
<sup>59</sup> The price of tilapia processed by Capital Fisheries was 35–45 ZMK/kg, whereas that of small horse mackerel was 22 ZMK/kg in a supermarket in Lusaka in June 2019. The prices of horse mackerel in local open markets are lower

Angola, and these imports may facilitate fish consumption by low- and medium-income consumers.

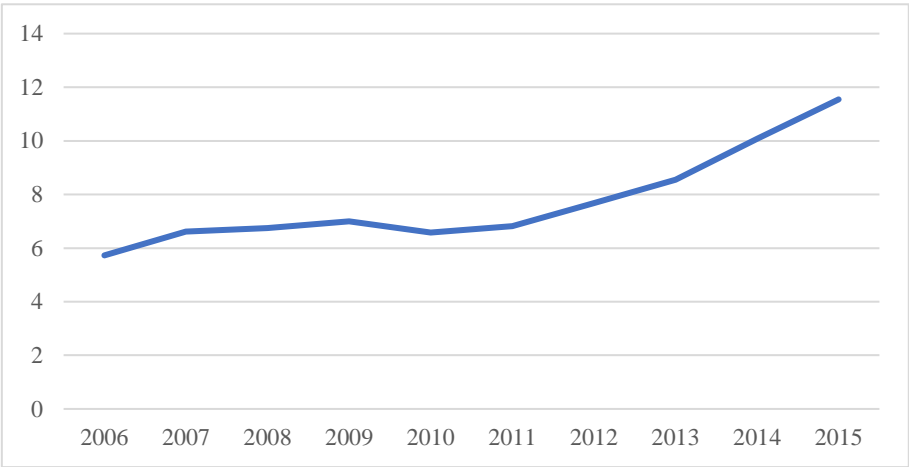


Figure 6-22: Fish consumption per capita in Zambia (kg)

Source: The Survey Team, developed based on the 2015 Fisheries Statistics Annual Report, MOFL and the World Bank database (<https://data.worldbank.org/country/zambia?view=chart>)

6.4.7. Policies and the role of the government

(1) Role of the government

The Department of Fishery in the MOFL consists of two branches: the capture fishery branch and the aquaculture branch. The aquaculture division is comprised of the i) Aquaculture Research Unit, ii) Aquaculture Development Unit, iii) Training Unit, and iv) Fisheries Statistics and Information Management Unit. The aquaculture branch engages in the development of more efficient species and production methods, supplying quality fingerlings, providing technical assistance to fish farmers, and so on.

(2) Policies

The Department of Fishery developed the National Aquaculture Development Strategy 2015-2020 (NADS) targeting the following goals.

- Improving the sector’s contribution to national food and nutrition security
- Improving the sector’s contribution to poverty reduction
- Improving the sector’s contribution to national economic growth
- Improving the sector’s contribution to Zambia’s balance of trade

The department developed the National Aquaculture Development Plan 2015–2020 (NADP) to achieve the NADS and has been implementing the plan. The NADP was designed based on

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than in supermarkets.

the National Agriculture Investment Plan and Vision 2030 (2006–2030). The four major pillars of the NADP are as follows.

Four pillars of the NADP

- **Enabling the environment:** Extension services; production factors, such as fish seed, fish feed, and finance; environmental impact assessments to allow easy entry by small and medium enterprises; harnessing water to make it available for aquaculture; increasing access to high potential aquaculture zones through access roads and bridges; waiving of some taxes on aquaculture equipment to make investment cheaper; exploring better marketing systems; conducting research to domesticate most technologies suitable for faster development of the sector; and promoting trade by removing trade barriers within and outside of the South African Development Community region.
- **Human resource development:** Increase in trained extension personnel to increase the ratio of extension agents to entrepreneurs.
- **Aquaculture-friendly institutions:** Capacity development of the Zambia Environmental Management Agency (ZEMA), the Zambia Bureau of Standards, the Ministry of Lands and Natural Resources, the Aquaculture Development Association of Zambia, training institutions in aquaculture, manufacturers of aquacultural inputs, and marketing institutions.
- **Legal framework responsive to aquaculture development:** Development of a sound legal framework for aquaculture development that protects the genetic, social, economic, physical, and political environments. This framework enables development in Zambia by the masses rather than mass production at the hands of a few actors.

(3) Activities

The following activities have been conducted in line with the NADP.

Progress of NADP implementation

- Implementation of an aquapark project as part of the Zambia Aquaculture Enterprise Development Project (ZAEDP). The target areas are two lakes based in Chipepo on Lake Kariba and Bangweulu on Lake Bangweulu as well as the surrounding smaller lakes, Lake Rufunsa, Lake Kasempa, and Lake Mungwi.
- Implementation of environmental briefs in Lake Kariba and Lake Lusiwasi in preparation for the installation of 170 cages and 170 pens in Lake Kariba and 110 pens in Lake Lusiwasi in Serenje to provide small and medium enterprises with easy entry into cage and pen aquaculture.
- Introduction of the aquaculture development fund managed by the Citizens Economic Empowerment Commission
- Training of 200 youths every year through ZAEDP
- Production of fingerlings
- Establishment of the Aquaculture Development Association of Zambia
- Preparation for the establishment of the Aquaculture Department
- Preparation for the recruitment of more extension officers
- Finalization of aquaculture regulations

6.4.8. Issues and opportunities

(1) Issues

Table 6-19 shows the result of the SWOT analysis for the cultured fish VC in Zambia. Weaknesses include insufficient supply of quality fingerlings and feed, difficult access to the credit, limited extension services, and unavailable cold chain infrastructure, and these more affect small-scale fish farmers rather than large-scale fish farmers. Value addition to fish through processing such as drying and fumigation is not much developed.

The threats facing the VC are the competition with less expensive imported fish and insufficient domestically produced soymeal as the major material of fish feed. Competition for water resources might be addressed by introducing water saving technology in the cropping and aquaculture sectors.

(2) Opportunities

The strength of the aquaculture in Zambia is the favorable and abundant water resources for fish farming. The opportunities of the VC are the expanding local and regional fish markets.

**Table 6-19: Results of the SWOT analysis of the cultured fish VC**

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>● Warm climate throughout the year, which enables stable fish production in Southern Province (particularly in the vicinity of Lake Kariba)</li> <li>● Rich water resources in Northern, Luapula, Copperbelt and North Western Province</li> <li>● Lake Kariba, Lake Tanganyika, Lake Mweru, and Lake Bangweulu, where cage aquaculture is possible</li> </ul>	<p><b>Weaknesses</b> (applicable to small-scale fish farmers)</p> <ul style="list-style-type: none"> <li>● Difficult access to credit for capital investments, working capital, and so on</li> <li>● Insufficient extension services due to a shortage of extension agents and poor means of transportation</li> <li>● Limited access to quality feed in rural areas</li> <li>● Limited access to quality fingerlings</li> <li>● Insufficient knowledge of fish farmers</li> <li>● Lack of nurseries that can raise fingerlings for three months and sell the fish to producers</li> <li>● Lack of cold chain infrastructure</li> <li>● Insufficient processing and value addition</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>● Growing domestic and regional markets (one-third of domestic fish consumption is imported)</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>● Cheap imported fish (i.e., horse mackerel from Namibia)</li> <li>● Insufficient supply of soymeal for fish feed companies (competition with livestock feed companies)</li> <li>● Competition with the cropping sector for water resources</li> </ul>

Source: The Survey Team

**6.5. Assistance by DPs for the VCs of Soybeans, Chicken Meat, and Cultured Fish**

This section discusses the aid projects for soybeans, poultry, and aquaculture run by other DPs.

6.5.1. AfDB

(1) ZAEDP

The MOFL is currently implementing the ZAEDP (2017–2022), financed by the AfDB. To transform smallholder farmers from self-sufficiency to being business-oriented, training is provided on feed, cages, the cold chain, and so on, and investments are brought in from the

private sector. The project consists of 1. breeding species with high weight-gain efficiency and productivity, 2. improving financial access for processing businesses with the aim of purchasing inputs (fingerlings and feed) and introducing equipment for aquaculture businesses by providing as much as ZMK 2.37 billion in loans, 3. developing a structure that enables fish farmers to buy feed in rural areas by recruiting and training businesses that can transport the products of large-scale feed manufacturers (the funds for starting these business will be sourced from the ZMK 2.37 billion in loans), and 4. conducting training sessions on fabricating aquaculture inputs, such as cages, farming and processing fish, and promoting one's business.

As part of the ZAEDP, the AfDB is assisting in the development of aquaparks<sup>60</sup> by the MOFL in Rufunsa district (Lusaka Province), Chipeko (Southern Province), Samfya (Luapula Province), Mungwi district (Northern Province), and Kasemupa district (North Western Province). The government oversees the construction of hatcheries, feed factories, ponds for demonstration, and facilities for training as well as the implementation of training. Private companies will operate the hatcheries and the feed factories. Japanese companies are also expected to participate in the formation of the aquaculture industry with an aquapark at its center, including investments in aquaculture businesses near the park. However, the ZMK 2.37 billion in loans discussed in point 2 is earmarked for Zambians and cannot be utilized by foreign companies. Since 2018, the government has conducted training sessions for 500 individuals, and the designs of the hatchery and feed factory park are currently in development.

#### 6.5.2. DFID

Assistance by the DFID is broadly divided into projects with direct interventions and projects without direct interventions. The former is the Climate Smart Agribusiness in Zambia Program (2016–2021), through which the DFID is in the process of implementing a training program on techniques for conservation agriculture (i.e., organic fertilizers, crop rotation, and minimum tillage) for smallholder farmers across every province except for Northern Province (140,000 ha). A total of 269,000 farmers have participated in the training program thus far, and 200,000 of them have started applying new production techniques for their crops, including maize, soybeans, and groundnuts. This project also provides assistance with agricultural inputs as well as sales and marketing, but it does not add sufficient value for the crops to be priced higher than other crops are. The DFID is planning on raising awareness among buyers in the future.

As a non-direct intervention project, the DFID has been investing in AgDevCo<sup>61</sup> since 2014. AgDevCo operates four schemes: 1. loan lending, 2. equity investment, 3. a combination of loan

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<sup>60</sup> It has also been pointed out that the aquapark concept is developed based on the FB model of the Ministry of Agriculture (<http://www.daily-mail.co.zm/yalelo-help-stem-fish-imports/>).

<sup>61</sup> AgDevCo is an agricultural investment company for developing countries based in Britain. Its funding partners include the DFID and the Mastercard Fund (see <https://www.agdevco.com/>).

lending and equity investment, and 4. technical assistance for agriculture. AgDevCo includes “benefits to smallholder farmers” as a criterion for its selection of investment projects, and the AgDevCo smallholder farmer development unit provides support for the invested projects. The DFID has committed USD 13 million to AgDevCo thus far and has invested USD 10.4 million in the following four programs via AgDevCo:

- (1) Northern Zambia Green Field Investment: produces and sells maize seeds, potatoes, and seeds for export to adjacent countries.
- (2) Agribusiness in Grain Handling in Copper Belt province: smallholder farmers produce soybeans, oil, and poultry feed and sell these items. Poultry feed is not currently being produced. The VC for soy is still in development, and the significant fluctuation in its price is recognized as an issue.
- (3) Goldenlay company<sup>62</sup> (poultry (egg production)).
- (4) Livestock industry.

#### 6.5.3. IFAD

The Enhanced Smallholder Agribusiness Promotion Programme (E-SAPP), implemented by IFAD, targets 30 districts and aims to improve the incomes of rural farmers engaged in market-oriented agriculture and promote food safety and nutrition. As of June 2019, target groups have been confirmed, and specific activities, such as Farmers’ Field Schools, are expected to begin in the near future. E-SAPP targets legumes, including soybeans; aquaculture; livestock (poultry); and rice, and target crops are determined based on recommendations from extension officers for each district. In selecting target crops, E-SAPP emphasizes the production volume and the presence of a market; as a result, Southern Province focuses on livestock, Eastern Province focuses on peanuts, Northern Province focuses on miscellaneous beans, and Central and Copperbelt Provinces focus on soybeans.

E-SAPP divides smallholder farmers into the following three categories and conducts activities that align with the economic levels of each group. It is also characterized by a methodology by which farmers in the upper group also serve as mentors for those in lower groups rather than adopting the conventional method of technology dissemination by government extension staff and lead farmers.

- (1) Group A (self-sufficient): This group’s primary concern is low productivity due to such factors as a limited water supply and a lack of access to superior seeds, and this concern must be addressed before these farmers can worry about marketing. The project will move forward based on an accurate understanding of their needs.

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<sup>62</sup> <http://www.goldenlay.co.zm/>



- (2) Group B (able to engage in economic activities): Joint sales are promoted to improve price bargaining power; this group’s challenge is the post-harvest processing and aggregation of produce. Farmers’ position will be raised to that of middlemen, who have been accused of exploiting farmers. It would be ideal to provide training sessions to middlemen to raise their awareness as well, but their lack of visibility is an issue.
- (3) Group C (commercial-based): This group’s focus is the production of agricultural produce with added value and the enhancement of partnerships between purchasers, companies related to agricultural inputs, agricultural financial institutions, and farmers through the utilization of matching funds. The contribution ratio of this fund is set at 50:50 for group C (for group B, the farmers’ burden is slightly mitigated, with a ratio of 60:40).

#### 6.5.4. EU

The Sustainable Commercialization of Zambia’s Smallholder Farmers Programme, which started in 2018, aims to improve farmers’ income by transitioning them from low-productivity agricultural practices to agriculture with diversified crops and by promoting the safety of food and nutrition. Through this program, funding (half as grants and half as loans) is provided to agricultural investment projects (i.e., agricultural finance, agricultural technology services, and agricultural input sales) by private companies selected through a proposal-based process. The program targets Zambia as a whole, and there are no specific target crops. However, of the EUR 22 million allocated for project funding, EUR 17 million are earmarked for agriculture, and EUR 5 million are earmarked for aquaculture.

### 6.6. Workshop Results

- (1) Outline of the workshop

Date: December 13, 2019 (Fri.) 9:30–13:00

Venue: Crismar Hotel Lusaka (in Lusaka)

Participants: 35 (government/related public institutions: 25, private companies/organizations: 10)

Schedule: The Survey Team conducted the workshop according to the following schedule.

Time	Activities	Responsibility
09:30–10:00	● Admission	● The Survey Team
10:00–10:05	● Opening remarks	● JICA Zambia Office
10:05–10:15	● Introduction of participants ● Explanation of objectives, expected outputs, and workshop program	● The Survey Team
10:15–10:30	● Presentation of the survey results and FVC development project concepts	● The Survey Team (Dr. Kotegawa) Soybeans
10:30–10:45		● The Survey Team (Dr. Ikeda) Poultry
10:45–11:00		● The Survey Team

		(Mr. Machida) Aquaculture
11:00–11:50	● Group discussion (three groups are formed by participants with interest in the same target crop)	● The Survey Team
11:50–12:05	● Sharing the discussion results of each group, Q&A	● The Survey Team (Soybeans)
12:05–12:20		● The Survey Team (Poultry)
12:20–12:35		● The Survey Team (Aquaculture)
12:50–12:55	● Closing remarks	● MOFL
12:55–13:00		● JICA Zambia Office
13:00–13:00	● Lunch and networking (end of the workshop)	● The Survey Team

## (2) Activities of the workshop



Presentation of group work



SWOT analysis of soybean VC



Networking among the participants

## 6.7. Environmental and Social Considerations

### 6.7.1. Policy, legal, and regulatory framework related to agricultural investment and environmental and social considerations in Zambia

#### (1) Policy framework

##### 1) Vision 2030

Vision 2030 was Zambia's first ever long-term written plan and was adopted at the National Stakeholders' Conference in 2016. By 2030, Zambians aspire to live in a strong and dynamic middle-income industrial nation that provides opportunities for all citizens to improve their well-being, embodying the values of socio-economic justice and underpinned by the principles of: (i) gender-responsive sustainable development, (ii) democracy, (iii) respect for human rights, (iv) good traditional family values, (v) positive attitudes towards work, (vi) peaceful coexistence, and (vii) private-public partnerships. These principles form the basis for interfacing with all sectors and provide direction for short and medium-term planning. Vision 2030 is being operationalized through the implementation of five national development plans, beginning with the Fifth National Development Plan, covering the period from 2006 to 2010<sup>63</sup>.

<sup>63</sup> Vision 2030 (2006)

**Relevance:** In Vision 2030, the agriculture sector set up its sector vision as “an efficient, competitive, sustainable and export-led agriculture sector that assures food security and increased income by 2030.” To achieve this goal, the plan targets increased agricultural productivity, increased exports of agricultural and agro-processed products, agro-mechanization, increased livestock and fish populations, and so forth (see Table 6-20). The FB Development program<sup>64</sup> can contribute considerably to achieving these goals, and, hence, the relevance of Vision 2030 is very high.

**Table 6-20: Sector vision and targets/goals in Vision 2030 that seem related to agricultural investments and environmental and social considerations**

Sector	Sector Vision	Targets/Goals
Agriculture	An efficient, competitive, sustainable, and export-led agriculture sector that assures food security and increased income by 2030	<ul style="list-style-type: none"> <li>i. <u>Increase agricultural productivity and land under cultivation</u> by 2030;</li> <li>ii. <u>Increase exports of agricultural and agro-processed products</u> by 2030;</li> <li>iii. Preserve the agricultural resource base by 2030;</li> <li>iv. <u>Increase land under cultivation</u> to 900,000 hectares by 2030;</li> <li>v. <u>Increase land under irrigation</u> to 400,000 hectares by 2030;</li> <li>vi. <u>Increase agricultural machinery to 2 tractors per 100 hectares</u> by 2030;</li> <li>vii. <u>Increase the livestock population</u> to 6,000,000 by 2030;</li> <li>viii. <u>Increase the fish population</u> to 300,000 mt by 2030.</li> </ul>
Land	Secure, fair, and equitable access and control of land for the sustainable socio-economic development of Zambia by 2030	<ul style="list-style-type: none"> <li>i. <u>Use land productively for socio-economic development</u> by 2030;</li> <li>ii. Provide <u>equal access to productive land</u> for socio-economic development to women, men, and the disabled by 2030.</li> </ul>
Manufacturing	A technology-based and export-focused manufacturing sector that is dynamic and competitive with effective entities that add value to the locally abundant natural resources by 2030	<ul style="list-style-type: none"> <li>i. Develop <u>fully integrated rural-based, agro-based, and light manufacturing</u> by 2030;</li> <li>ii. Increase general manufacturing’s contribution to GDP to a share of 36.12 by 2030;</li> <li>iii. Increase manufactured exports as a share of merchandise exports to 71 percent by 2030.</li> </ul>
Environment and natural resources	A productive environment and well-conserved natural resources for sustainable socioeconomic development by 2030	<ul style="list-style-type: none"> <li>i. Rehabilitate and reconstruct sewage treatment facilities in all major towns and cities;</li> <li>ii. Collect and transport 80 percent of waste;</li> <li>iii. Develop an Integrated Licensing System;</li> <li>iv. Ensure that 90 percent of polluting industrial facilities <u>comply with environmental legislation</u>;</li> <li>v. Upgrade 80 percent of unplanned settlements such that the residents have access to clean drinking water and sanitation facilities.</li> </ul>

Note: Articles that seem related to agricultural investment and environmental and social considerations

<sup>64</sup> Chapter 9 in this report presents FB development program in detail.

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are underlined in this table.

Source: Extracted from Zambia 2030.

## 2) Seventh National Development Plan (2017-2021)<sup>65</sup>

The Seventh National Development Plan (7NDP) for the period from 2017 to 2021 is the successor to the Revised Sixth National Development Plan and has the theme of “accelerating development efforts towards the Vision 2030 without leaving anyone behind.” Based on the chosen theme, the goal of the 7NDP is to create a diversified and resilient economy for sustained growth and socio-economic transformation that is driven by agriculture, among other factors. To achieve economic diversification, the 7NDP prioritized and identified ten critical development outcomes that will support this objective. “A diversified and export-oriented agriculture sector” is one of these outcomes, and several key strategies are identified to achieve this outcome, including improving production and productivity (including FB development), enhancing agriculture VCs, enhancing investment in agricultural infrastructure, and promoting small-scale agriculture. The reason for focusing on small-scale agriculture is that even if large-scale managerial and corporate agriculture can facilitate connections between downstream activities and agro-industry and contribute to meeting the growing food demand, this process is more likely to be capital intensive and, thus, offer fewer prospects for job creation. This process is less sustainable in the long run owing to its reliance on fossil fuels. In addition, the 7NDP highlights ten areas in which the government will intervene directly to bring about the creation of jobs at an accelerated rate, called “Quick-Wins.” Among them, the development of FBs with core ventures and contract farming with an effective out-grower scheme for small-scale farmers are mentioned for the coffee industry and tea processing industry development areas.

**Relevance:** The 7NDP is highly related to the projects proposed by this survey because the plan considers not only the promotion of large-scale commercial farming but also ways to provide benefits to small-scale farmers.

## 3) Second National Agriculture Policy (2016-2020)<sup>66</sup>

The launch of the Second National Agricultural Policy (2NAP) 2016–2020 seeks to address the challenges faced during the implementation of the First NAP. The 2NAP has a shorter duration of five years, whereas the First NAP ran for twelve years. The shorter duration conforms to the standard policy duration of five years, and the reduced time period allows for better monitoring and evaluation. Like the 7NDP, the 2NAP focuses on ten strategic objectives, such as the improvement of agricultural production and productivity, promoting the private sector’s

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<sup>65</sup> Government of Zambia (2017) Seventh National Development Plan

<sup>66</sup> Policy Monitoring and Research Center (n.d.), Analysis of the Second National Agricultural Policy 2016-2020

participation in agricultural development, and so on. The latter objective focuses on promoting the development of agricultural FBs. The 2NAP sets out ten objectives to improve the state of agriculture in Zambia. These objectives are set based on the guideline that the government will facilitate a privately-led agriculture sector.

**Relevance:** The promotion of FB development is a specific intervention to increase private sector participation in agricultural development in the 2NAP, and, hence, the relevance of the 2NAP is very high.

4) National Policy on Environment (2007)

The National Policy on Environment (NEP) aims to achieve increased economic growth that does not damage the environment or natural resources. The NEP offers strategic guidance on nine key economic sectors identified in the Poverty Reduction Strategy of 2002.

**Relevance:** The agriculture sector is recognized as one of the key economic sectors in the NEP. To promote environmentally sound agricultural development by ensuring sustainable crop and livestock production through ecologically appropriate production and management techniques and an appropriate legal and institutional framework for sustainable environmental management, the NEP set forth eight guiding principles and fourteen strategies for the agriculture sector. Future investment programs should be formulated by considering the guidelines and strategies in Table 6-21.

**Table 6-21: Eight guiding principles for the agriculture sector set by the NEP**

<p><b>Guidelines</b></p> <p>A) Increased agricultural production should be based on improving farming systems and increasing the security of tenure on currently allocated land rather than on the expansion of cropland;</p> <p>B) Appropriate legislation, agricultural policy, and planning should involve the local community and NGO participation at all levels;</p> <p>C) Agricultural policy and planning should be closely coordinated with land use, water, and natural resources policy and planning;</p> <p>D) Agricultural policy and planning should incorporate the environmental costs of soil erosion and the loss of soil fertility;</p> <p>E) Watershed management activities should be accorded the highest priority to conserve water, prevent further soil degradation, and improve soil fertility;</p> <p>F) To be effective, land husbandry and rehabilitation interventions must be implemented on a catchment and community basis;</p> <p>G) The use of organic and inorganic fertilizers should be balanced by taking into consideration their contributions to soil fertility and budgetary requirements; and</p> <p>H) New appropriate legislation is required to promote sustainable agriculture.</p>
<p><b>Strategies</b></p> <p>A) Intensify production on suitable lands to avoid expansion into marginal or fragile areas;</p> <p>B) Integrate environmental awareness and education in community participatory agricultural</p>

<p>extension and research programs;</p> <p>C) Train research and extension staff on the community-based participatory approach for environmental concerns;</p> <p>D) Prevent or minimize the environmental impact of cultivation and other developments on marginal lands (e.g., steep slopes, “dambos<sup>67</sup>,” swamps, and areas susceptible to flooding) through improved cultivation and agricultural production;</p> <p>E) Review, evaluate, and develop agricultural policies and a legislative and institutional framework on a regular basis for the purpose of incorporating environmental concerns and inter-sectoral links;</p> <p>F) Review and enact legislation to protect environmentally fragile areas from agricultural encroachment;</p> <p>G) Embark on intensive education, extension, and mass awareness programs and promote community participation in soil conservation measures and integrated land use systems in all parts of the country;</p> <p>H) Promote research into appropriate and sustainable soil and water conservation techniques;</p> <p>I) Promote proper animal husbandry practices to avoid overgrazing; the spread of disease; soil erosion; the loss of soil fertility; air, land, and water pollution; the loss of biodiversity; and overall environmental degradation;</p> <p>J) Promote community participation in environmental conservation programs, including communal catchment protection and conservation;</p> <p>K) Ensure that trade policies on agricultural commodities and inputs encourage environmentally sound production systems;</p> <p>L) Review and implement the Pesticide and Disease Control Act;</p> <p>M) Promote conservation-oriented farming practices, especially in areas prone to lateralization and nutrient leaching; and</p> <p>N) Introduce area-specific technologies, including fertilizers, seed varieties, and soil conservation.</p>
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Source: Extracted from NEP (2007)

#### 5) Zambia National Forest Policy (2014)

Zambia National Forest Policy (NFP) aims to achieve sustainable management of all types of forests in the country to enhance the contributions of forest products and services to the mitigation of climate change, income generation, poverty reduction, job creation, and the protection and maintenance of biodiversity. The policy also aims to reduce deforestation and forest degradation by focusing on increasing forest cover and enhancing carbon stocks through integrated participatory forest management, improved law enforcement, and private sector investment.

**Relevance:** Through this policy, Forest Act No. 4 of 2015 was enacted, and future projects should comply with this act. All necessary applications must be submitted and approved before the commencement of any project activities.

#### 6) Second National Biodiversity Strategy and Action Plan (2015–2025)

Zambia’s Second National Biodiversity Strategy and Action Plan (NBSAP-2) covers the period from 2015 to 2025, and its vision is “By 2025, biodiversity is valued, conserved, restored

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<sup>67</sup> Dambo is seasonally waterlogged area.

and wisely used, maintaining ecosystem services, sustaining a healthy environment and delivering benefits essential for all Zambians and the Zambian economy.” In the plan, following an analysis on the biodiversity situation in Zambia, five strategic goals are identified with key performance indicators.

**Relevance:** “By 2025, areas under agriculture, aquaculture and forestry (forest reserves, parks, Game Management Areas, forest concessions, open areas) are managed sustainably, ensuring the conservation of biodiversity” is one of the target strategic goals to achieve. In addition, the rationalization of Protected Areas (PAs) to achieve representativeness and ecological connectivity at the landscape level is planned by 2020. Because FBs are located in rural areas and are likely to be close to the rationalized PAs, project proponents should carefully follow up on the latest status of the relevant laws and regulations before commencing any activities.

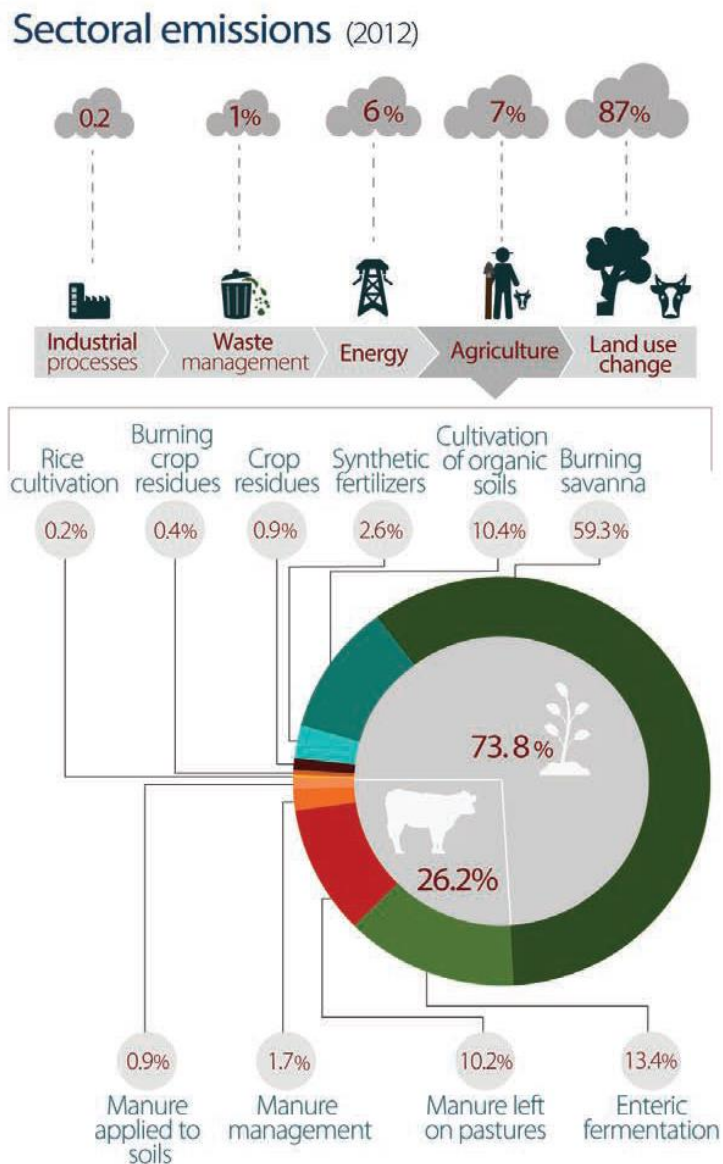
7) Second National Policy on Climate Change (2017)

In September 2016, together with 186 other countries and nations, the Government of Zambia signed the Paris Agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low-carbon future. Subsequently, in 2017, the government launched the National Policy on Climate Change (NPCC), which was aimed at stemming the impact of climate change and the subsequent reduction of Zambia’s economic growth owing to crop failures and the impact of climate change on energy production.

Although the NPCC emphasizes several measures, such as ensuring that investments adhere to sustainable, low-carbon development principles, the promotion of Strategic Environmental Assessment as

a tool for integrating low emissions principles, mainstreaming climate change programs, and so forth, concrete legislation (e.g., the Low Carbon City Promotion Act in Japan) has not yet been enacted.

**Relevance:** According to the International Centre for Tropical Agriculture and the WB, the greatest sectoral greenhouse gas emitter in Zambia was the land use, land-use change, and forestry sector (accounting for 86.6% of total emissions), whereas agriculture was responsible



**Figure 6-23: Greenhouse gas emissions trends of Zambia’s agricultural sector**

Source: International Centre for Tropical Agriculture; WB. 2017. *Climate-Smart Agriculture in Zambia*. CSA Country Profiles for Africa Series. International Center for Tropical Agriculture, Washington, D.C. 25 p.



for 7% (23.1 MtCO<sub>2</sub>e) of Zambia’s total annual emissions, which were estimated to be 364.17 MtCO<sub>2</sub>e in 2012. With its vast natural grasslands, a large component of agricultural greenhouse gas emissions in Zambia is related to the burning of savanna (59.4%), followed by enteric fermentation from livestock production (13.4%), cultivation of organic soils (10.4%), and manure left on pastures (10.2%) (see Figure 6-23).

FB development may involve large-scale land-use changes and changes in farming methods as well as the risk of such impacts as a decline in agricultural productivity due to climate change. Thus, appropriate mitigation and adaptation measures (e.g., the breeding and introduction of improved varieties, pest control, reduction in tillage frequency, etc.) should be taken.

8) National Employment and Labor Market Policy (2004)<sup>68</sup>

The overall objective of the National Employment and Labor Market Policy (NELMP) is to create adequate and quality jobs under conditions that ensure adequate incomes and protections of workers’ basic rights. The NELMP is guided by the principles of equity, equality, responsiveness, social protections, productivity, social dialogue, and sustainability.

**Relevance:** The NELMP highlights that the government encourages the opening of FBs as a way to target investment and job creation. The NELMP also recognizes the importance of synergies between large- and small-scale producers, as an out-grower scheme will contribute to job creation, poverty reduction, and local economic growth.

(2) Legislative framework

The existing acts and regulations related to agricultural investments and environmental and social considerations in Zambia are summarized in Table 6-22. The acts and regulations related to land acquisition and resettlement are summarized in a separate matrix presented in Article 6.7.26.7.2.

**Table 6-22: Major acts and regulations related to environmental and social considerations in Zambia**

Category	Acts, Regulations, etc.	Short Summary
a. Environment	✓ Environmental Management Act, No. 12 of 2011	✓ Stipulates the role of ZEMA (formerly ECZ) and prohibits environmental pollution, especially air pollution, water pollution, and solid waste.
	✓ Water Resource Management Act, 2011	✓ Stipulates the role of the Water Resource Management Authority and the necessary legal procedures for water resource

<sup>68</sup> NELMP, 2004

		development, such as dam construction and borehole drilling, for water resource management and protection of the ecosystem.
b. EIA	✓ The Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, 1997 / Statutory Instrument (SI) No. 28 of 1997	✓ See chapter 3.9.1. of this report, “EIA Regulations and System in Zambia,” for more details.
c. Pollution Control and Management	✓ The Environmental Management (Licensing) Regulations, 2013	✓ Regulates the maximum allowable limits of discharging air pollutants, water pollutants, and hazardous waste and their management practices. With the enactment of these regulations, the following were repealed: <ul style="list-style-type: none"> <li>➤ Environmental Protection and Pollution Control Act 1990 and amendment in 1999</li> <li>➤ The Air Pollution Control (Licensing and Emissions Standards) Regulations, 1996</li> <li>➤ The Hazardous Waste Management Regulations, 2001</li> <li>➤ The Water Pollution Control (Effluent and Wastewater) Regulation, 1993</li> </ul>
d. Ecosystem, Biodiversity	<ul style="list-style-type: none"> <li>✓ Zambia Wildlife Act, 2015</li> <li>✓ Forest Act No. 4 of 2015</li> <li>✓ Biosafety Act No. 10 of 2007</li> </ul>	<ul style="list-style-type: none"> <li>✓ Stipulates prohibited acts in National Parks, Community Partnership Parks, Bird and Wildlife Sanctuaries, and Game Management Areas, among others. Activities or plans that cause adverse effects on the above areas are subject to wildlife impact assessments to be submitted to the Zambia Wildlife Authority.</li> <li>✓ States necessary procedures for obtaining permission from the authority for sustainable forest resource management.</li> <li>✓ Prohibits the development, production, import, export, transit, contained use, or release to the market of any genetically modified organisms without the prior approval of the authority.</li> </ul>
e. National Heritage	✓ National Heritage Conservation Commission Act, 1989	✓ Prohibits development activities in any ancient, cultural, and natural heritage sites, national monuments, and relics declared in the Act.
f. Employment, Occupational Health and Safety	<ul style="list-style-type: none"> <li>✓ Employment Act, as amended by Act No. 15 of 2015</li> <li>✓ Occupational Health and Safety Act, 2010</li> </ul>	<ul style="list-style-type: none"> <li>✓ Summarizes specific employment conditions for labor in Annex-1 of this Report.</li> <li>✓ Establishes the Occupational Health and Safety Institute and provides for its functions.</li> </ul>

Source: The Survey Team based on interviews with ZEMA, among others (2019)

### (3) EIA regulations and system in Zambia

Through the enactment of The Environmental Protection and Pollution Control

(Environmental Impact Assessment) Regulations, 1997 / Statutory Instrument No. 28 of 1997, the Government of Zambia introduced the EIA process. The EIA process in Zambia is classified into two categories in accordance with the likely potential impact of the planned project. Projects that fall into the first and second categories are required to submit an Environmental Impact Statement (EIS) and an Environmental Project Brief, respectively. The former statement includes not only an EIA report but also a Resettlement Action Plan (RAP), and the latter is comparable to the Initial Environmental Examination in JICA's guidelines on environmental and social considerations.

According to ZEMA, large-scale agricultural development projects, such as FBs, are absolutely required to submit an EIS.<sup>69</sup> Projects that are required to submit an EIS in the agriculture, fisheries, and food processing sectors are listed in Table 6-23 below. However, it should be noted that even if a project is below the threshold value or is not listed in this table, the project proponent is still required to submit an EIS to ZEMA if the authority deems it necessary.

**Table 6-23: Projects required to submit an EIS in the agriculture, fisheries, and food processing sectors in Zambia**

Serial Number	Category	Projects that are required to submit an EIS
3.	Dam, rivers, and water resources	(a) Dams and barrages covering 25 ha or more. (b) Exploration for and use of groundwater resources, including the production of geothermal energy, with water to be extracted over 2 million cumecs (m <sup>3</sup> /s).
5.	Forestry-related activities	(a) Clearance of forestry in sensitive areas, such as watershed areas or for industrial use, of 50 ha or more. (b) Reforestation and afforestation. (c) Wood processing plants handling 1,000 tons or more.
6.	Agriculture	(a) Land clearance for large-scale agriculture. (b) Introduction and use of new agrochemicals in Zambia. (c) Introduction of new crops and animals, especially exotic ones that are new to Zambia. (d) Irrigation schemes covering an area of 50 ha or more. (e) Fish farms with production of 100 tons or more a year. (f) Aerial and ground spraying.
7.	Processing and manufacturing industry	(a) Cement works and lime processing of 1,000 tons or more a year. (b) Fertilizer manufacturing or processing of 1,000 tons or more a year. (c) Tanning and dressing of hides and skins of 1,000 skins a week. (d) Abattoirs and meat processing plants handling 20,000 or more carcasses a month. (e) Fish processing plants handling more than 100 tons a year. (f) Pulp and paper mills with daily output above 50 air-dried tons. (g) Food processing plants with output of 400 tons or more a year.
8.	Electrical infrastructure	(a) Electricity generation stations. (b) Electrical transmission lines carrying 220 Kv that are more than 1 km long. (c) Surface roads for electrical and transmission lines that are more than

<sup>69</sup> Interview with ZEMA (2019)

		1 km long.
9.	Waste disposal	(a) Sites for solid disposal and construction of permanent disposal sites handling 1,000 tons or more a day.
		(b) Sites for hazardous disposal of 100 tons or more a year.
		(c) Sewage disposal work with a capacity of 15,000 liters or more a day

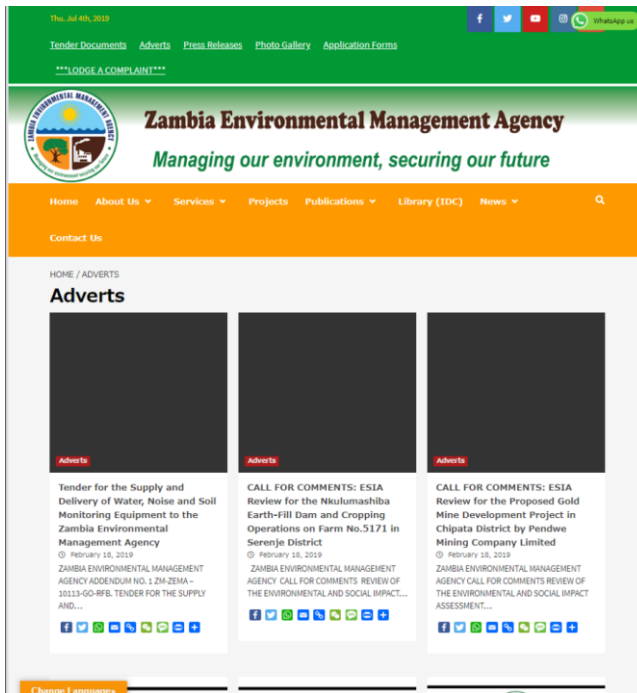
Source: The Survey Team based on The Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, 1997/Statutory Instrument No. 28 of 1997

The EIS and RAP review and approval procedures in Zambia are shown Table 6-24. In addition, because the terms "client" and "developer" are used interchangeably in the original text, all uses are changed to "project proponent" in this report. When ZEMA reviews a draft EIS, it holds public hearings at the expense of the project proponent if (i) ZEMA decides that a public hearing could help it to make a fair judgement or (ii) ZEMA recognizes a need for environmental conservation.

**Table 6-24: EIS and RAP review and approval procedures in Zambia**

Stage	Description	Timeframe	Responsibility
1	Submit project proposal or request for confirmation of the project if it requires an EIS	Up to the project proponent	Project proponent
2	Screen project and respond	2 days	ZEMA
3	Submit draft scoping report and Terms of Reference (ToRs)	Up to the project proponent	Project proponent
4	Review ToRs and revert to project proponent	7 days	ZEMA
5	If adequate, submit final scoping report and ToRs	Up to the project Proponent	Project proponent
6	Submit first draft of EIS report	Up to the project proponent	Project proponent
7	Review first draft of EIS report and revert to project proponent	15 days	ZEMA
8	Submit corrected version	Up to the project proponent	Project proponent
9	Review subsequent revised reports and revert to project proponent	5 days	ZEMA
10	Submit twelve copies of the final report or corrected drafts (steps 8 and 9 apply)	Up to the project proponent	Project proponent
11	<b>a. Without Public Hearing Meeting</b>	Within 65 days	ZEMA
	Request comments from authorizing agencies		
	Advertise for public comments		
	Conduct verification inspection		
	<b>b. With Public Hearing Meeting</b>	Within 90 days	ZEMA
	Request comments from authorizing agencies		
	Advertise for public comments		
	Conduct verification inspection		
	Advertise for public hearing meeting		
	Conduct public hearing meeting		
12	Make a decision	Within 15 days	ZEMA board
13	Communicate decision to project proponent		ZEMA

Source: The Survey Team, based on an EIA in Zambia (ZEMA)



**Figure 6-24: Example advertisement for public comments on ZEMA’s homepage (left) and announcement of public hearing through social networking service (Right)**

Source: <http://www.zema.org.zm/index.php/category/adverts/> and <https://www.facebook.com/zema.org.zm/> (Accessed on July 3, 2019)

The EIS review fees to be paid to ZEMA are summarized below. For instance, if the Ministry of Agriculture implements a development project with grant providing a budget of USD 20 million, the Ministry of Agriculture, as a project proponent, is obligated to pay USD 50,501 to ZEMA for its EIS review fee.

**Table 6-25: ZEMA’s EIS review fees**

Items	Fee Units	Fees in different currencies		
		ZMW	USD	YEN
1 Review of Environmental Project Brief	43,333	13,000	1,010	108,952
2 Review of EIS				
a. Less than USD 100,000	43,333	13,000	1,010	108,952
b. USD 100,000 -500,000	216,665	65,000	5,050	544,759
c. USD 500,000 – 1,000,000	541,662	162,499	12,625	1,361,896
d. USD 1,000,000 – 10,000,000	1,083,324	324,997	25,250	2,723,792
e. USD 10,000,000 – 50,000,000	2,166,650	649,995	50,501	5,447,589
f. USD 50,000,000 or more	3,249,975	974,993	75,751	8,171,383

Note: 1 fee unit = K 0.3, the items and fee units above are based on the Fifth Schedule (Regulation 37) and an interview with ZEMA. JICA Exchange Rate in July 2019: USD 1 = 107.871 .

Source: The JICA Survey Team

- (4) Other international and regional protocols and conventions related to environmental and social considerations

The major international and regional protocols and conventions related to environmental and

social considerations that were ratified by Zambia are listed below:

- International Plant Protection Convention for the Prevention and Control of the Introduction and Spread of Pests of Plants and Plant Products, 1951
- Vienna Convention of the Law for Treaties, 1961
- African Convention on the Conservation of Nature and Natural Resources, 1968
- Convention on Wetlands of International Importance especially as Waterfowl Habitat (RAMSAR Conventions), 1971)
- Convention Concerning the Protection of the World's Cultural and Natural Heritage, 1975
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1981
- Statutes for the International Union for the Conservation of Nature and Natural Resources, 1985
- Zambezi River Authority Agreement, 1987
- Agreement on the Action Plan for the Environmentally Sound Management of the Common Zambezi River System, 1987
- United Nations Convention on Biological Diversity (UNCBD), 1992
- United Nations Framework Convention on Climate Change (UNFCCC), 1992
- United Nations Convention to Combat Desertification (UNCCD), 1992
- Revised Southern African Development Protocol on Shared Watercourses, 2000
- Stockholm Convention on Persistent Organic Pollutants, 2001
- Convention on Sustainable Management of Lake Tanganyika, 2003

6.7.2. Legal framework on land acquisition and resettlement that must be complied with for agricultural investment in Zambia

(1) Policy framework

1) National Land Policy (under formulation as of October 2019)

The National Land Policy (NLP) is the first comprehensive land policy framework to be formulated since Zambia's independence. The formulation work began in 2002, and the Land Department of the Ministry of Lands and Natural Resources revealed that the Ministry was in the process of reviewing the final draft version, which would lead to a revision of the Lands Act of 1995. The following provides background on the formulation of the NLP:

- There is a need to improve land administration and management not only to preserve Zambia's remaining pristine conditions and its serenity and beauty but also to place its land development on a sustainable path for effective and efficient economic growth, and
- Civil Society land advocacy records indicate a rising number of land disputes before the

formal court system owing to a wave of illegal land allocations involving non-Zambians and between nationals as a result of large-scale investments in agriculture and mining, urban expansion, and other private uses nationwide. The increase in the number of land disputes is especially large in rural and peri-urban communities.

The four main goals of the NLP are as follows:

- i. The NLP primarily seeks to promote equitable access to state and customary land among all of Zambia's people, including both the poor and the wealthy and irrespective of gender.
- ii. The NLP seeks to strengthen land tenure security and enhance the sustainable and productive management of land resources by upholding transparent and cost-effective systems of administration.
- iii. The NLP provides a framework for better conservation and protection of ecologically sensitive areas within and outside of protected areas.
- iv. The NLP also provides a framework for more cost-effective and efficient settlements of land disputes.

**Relevance:** In addition to the above goals, to regulate land access by non-Zambians so as to provide land access and use rights to non-Zambians while still restricting ownership of both state and customary land to Zambians only, limitations and ceilings on the amount of land allocated for use by a single foreign investor will be introduced. Furthermore, the government also plans to develop and implement modalities aimed at permitting non-Zambian-owned companies to access and use land on a sub-lease or rental basis from the government, customary land authorities, or private landowners for investment purposes in line with their residential and investment objectives. These leases are not to exceed a period of 25 years and are renewable upon the fulfilment of prescribed conditions. As for large-scale land-based investments, both Zambian and non-Zambian investors are required to recognize and respect all existing rights to land and natural resources, obtain a Social and Environmental Impact Assessment approval certificate prior to leasing the land to minimize negative social and environmental impacts, and establish procedures for sound community consultation and participation by all those materially affected and guidelines for recording and enforcing the agreement before the land will be leased out.

## 2) National Resettlement Policy (2017)

The National Resettlement Policy (NRP) was formulated in response to a number of issues related to land disputes and developments that arose because a resettlement scheme was implemented for more than 24 years without a comprehensive policy and legal framework.

Involuntary resettlement due to the implementation of development projects, among other reasons, is increasing in recent years. Some of the key guiding principles and specific objectives for compensation under this policy are shown below.

- Guiding principles (the main points have been extracted)
  - All persons, groups, and communities have the right to suitable resettlement, which includes the right to alternative land that is safe, secure, accessible, affordable, and habitable;
  - Settlers shall be given permanent rights to the ownership and use of their land through the issuance of certificates of title to the land.
  - The amount of land allocated shall be commensurate to the settler's ability to develop the land or shall be adequate to support an average family with basic subsistence food and a reasonable surplus.
  - Involuntary resettlement shall be in line with the international human rights and humanitarian law set out in the 1998 United Nations Guiding Principles on Internal Displacement, which are recognized as an important international framework for the protection of internally displaced persons.
  - Involuntary resettlement should be avoided where feasible. If population displacement is unavoidable, it should be minimized by exploring all viable project options.
  - Unavoidably displaced persons should be compensated and assisted so that their economic and social futures are generally as favorable as they would have been in the absence of the project, if not better.
  
- Specific objectives for compensation (the main points have been extracted)
  - Compensation should be paid to persons that are physically or economically displaced before the development project causing displacement is commenced.
  - Prompt and effective compensation should be provided at the market or full replacement cost, whichever is higher, for losses of livelihood, assets, and access to assets attributable directly to the project.
  - Households headed by women and other vulnerable groups should be prioritized when paying compensation.
  - The government shall ensure that permanent and mutually agreed upon dwellings following national standards are provided to those displaced by investment projects.
  
- Specific objectives for involuntary resettlement (the main points have been extracted)
  - The promoter or investor shall be responsible for the resettlement or re-location, rehabilitation, and compensation of the persons displaced by an investment.



- Resettlement as a result of investment projects should be seen as an opportunity to improve the livelihoods of the affected people and should be undertaken accordingly by the investor.
- The investor or promoter, in consultation with the relevant government institutions, shall engage with the affected communities through a process of informed consultation and participation. The views of the affected communities and persons, including the host community, will be considered in the decision making process related to the resettlement and livelihood restoration, including options and alternatives where applicable.
- The promoter or investor, in collaboration with other relevant institutions, shall be required to identify alternative lands for resettlement for the population that has been displaced due to development.

**Relevance:** If involuntary resettlements, including not only physical displacements but also losses of the means of livelihood, occur because of an agricultural investment, it is necessary to develop an RAP in line with the guiding principles, specific objectives, and policies set by the NRP.

## (2) Legislative framework

Zambian acts related to land acquisition and resettlement caused by agricultural investment projects are summarized in Table 6-26.

**Table 6-26: Short summary of acts related to land acquisition and resettlement in Zambia**

Name of Act	Short Summary and Relevance
The Constitution of the Republic of Zambia (Amendment), 2016	<p>The Constitution of Zambia, Chapter 1 of the Laws of Zambia, and Article 16 of the Constitution provides for the fundamental right to property and protects persons from the deprivation of their property. It states that a person cannot be deprived of property compulsorily except under the Authority of an Act of Parliament, which provides for adequate payment of compensation.</p> <p><i>Relevance: The development of FBs involves the allocation of farmlands on state lands for settlers or on customary lands for the resettlement of affected persons. Under the Constitution, the residents of farmland and the owners of property, such as land, have the right to receive adequate compensation. "Adequate compensation" is defined in Article 3, Section 12 of the Land Acquisition Act, described below.</i></p>
Agricultural Lands Act, 1960	<p>The Agricultural Lands Act provides for the establishment of the Agricultural Lands Board, prescribes the composition and membership thereof and its powers and functions, and provides for tenant farming schemes with a thirty-year lease period and matters incidental to or connected with the foregoing.</p> <p><i>Relevance: The development of FBs involves the allocation of farmlands on state land. If the farmlands allocated to investors or settlers are not</i></p>

Name of Act	Short Summary and Relevance
	<p><i>properly managed, provisions that are still valid, such as not renewing the leasehold rights, are described.</i></p>
<p>Lands Acquisition Act of 1994, Chapter 189</p>	<p>Article 2, Section 3 of the Act empowers the President of the Republic to compulsorily acquire property (especially in the case of unutilized and undeveloped lands or lands with absentee owners).</p> <p>Section 8 explains that if the residue of the acquired land is less than half an acre, the owner of such land may, within thirty days of the publication in the Gazette, be required by notice in writing served upon the Minister to yield possession to allow the President to acquire the whole of the land, and the President shall acquire the whole of the land.</p> <p>Article 3, Section 12 of the Act defines “adequate compensation,” as mentioned in the Constitution. Article 4 provides measures to be taken for unutilized and undeveloped land and absentee owners.</p> <p><i>Relevance: This law is very important, as it provides guidance on how land can be secured and legitimizes the compensation practice. This law assists in minimizing conflicts and discomfort amongst affected persons in the FBs.</i></p>
<p>Lands Act, 1995</p>	<p>According to Oyama (2017)<sup>70</sup>, the major changes in the Land Act, revised in 1995, are the following three points. (i) The rights associated with land title deeds have been significantly strengthened. Although the Land Act does not directly allow individuals to own land, it is recognized that land ownership has been practically allowed because Article 6 of the Land Act grants 99 years of leasing rights and Article 5 of the Act allows the leasing rights to be sold, transferred, or assigned. (ii) Article 3 of the Act eases the restrictions on land acquisition by non-Zambians to accelerate economic development by foreign capital. (iii) The land act merges reserve (formerly native reserve) and trust land (formerly native trust land) into customary land and makes it possible for non-Zambians to obtain land certificates if traditional leaders (chiefs) issue authorization.</p> <p><i>Relevance: This law is applicable when allocating lands to investors and companies in FB development programs. Notably, shortening the land lease period for non-Zambians is under discussion in the National Land Policy, which is still under formulation.</i></p>
<p>The Valuation Surveyor’s Act Cap 207</p>	<p>The Valuation Act stipulates the duty of registering valuers in Zambia, the rules for valuers conducting valuations (i.e., the ethical code), the level of remuneration to be paid to valuers, and so forth. In addition, Article 3 of the Act stipulates that the valuation of land (including houses and other buildings but not mineral resources, as defined by the Act) must be conducted only by registered valuers.</p> <p><i>Relevance: If there is a loss or relocation of property, such as privately owned land or houses, due to the FB development program, it is necessary to procure a registered valuer under the act and request a valuation<sup>71</sup>. The</i></p>

<sup>70</sup> S. Oyama (2017) Land Policy and Land Administration by Chief in Customary Lands in Zambia, (S. Takeuchi, ed., "The Land and Power of Contemporary Africa," Research Paper No. 631 Asian Economic Research Institute, November 2017 Reprinted)

<sup>71</sup> The land compensation unit price is calculated by the Government Valuation Department under the Ministry of Land using a standard valuation (based on interviews with the Ministry of Land in October 2019). In addition, evaluators on the district council are in charge of real estate appraisal. District councils set their own unit prices

Name of Act	Short Summary and Relevance
	<i>valuation of agricultural products shall be performed by the district agricultural coordinator.</i>
The Arbitration Act No. 19 of 2000	<p>According to Article 12 (2) of the Act, if the landowner or the possessor cannot agree on the amount of compensation, the arbitration party shall carry out a procedure to select one or more arbitrators. If the parties still cannot agree, an arbitrator with a different arbitration period shall be appointed at the request of the parties.</p> <p><i>Relevance: This law is among the essential laws for formulating a Complaint and Grievance Redress Mechanism and explaining it in the public consultation, and it can be used to resolve complaints related to compensation and relocation assistance.</i></p>
<b>Urban and Regional Planning Act, 2015</b>	<p>This act stipulates an “integrated development plan” aimed at alleviating poverty and improving the quality of life of community members. It also stipulates its planning authority (Articles 13 and 19), and compensation (Articles 68 and 69).</p> <p><i>Relevance: The FB development plan corresponds to an “integrated development plan” and, hence, the FB development program needs to be developed in coordination with province and district planning authorities.</i></p>

Source: The Survey Team

## 6.8. Legislative framework for agricultural investment in Zambia

### 6.8.1. Laws, regulations, and procedures for investments by foreign firms in Zambia<sup>72</sup>

#### (1) Laws, regulations, and procedures for the acquisition of Zambian firms by foreign firms

No law or regulation hinders the acquisition or purchase of shares of Zambian firms by foreign firms. However, there are regulations on foreign firms purchasing land in Zambia (see (3) below).

The necessary procedures for the acquisition or purchase of shares of Zambian firms differ in the following two cases.

#### 1) The name of the acquired firm (or firm for which the share is purchased) is not changed:

The foreign firm needs to complete Form 2 and submit it to the Patents and Company Registration Office (PACRA). The new ownership structure of the firm’s shares must be provided in Form 2.

#### 2) The name of the acquired firm (or firm for which the share is purchase) is not changed:

All of the previous registrations become invalid; the foreign firm must submit all the related

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by comparing each district’s standard unit prices with its actual conditions. This process is presumed to be driven by the fact that the Ministry of Land has no officials at the district level, and it is difficult to apply the standard property unit price to all districts universally (The Survey Team’s view).

<sup>72</sup> The contents of this section are based on an interview with the Zambia Development Agency (ZDA).

documents (e.g., business plans, financial statements, shareholder structure, and property lists) and newly register with PACRA and the Zambian Revenue Authority.

For lands owned by the new enterprise, the conditions in (3) below are applied (i.e., even if Zambian partners own less than a 75% share of the core venture, the foreign partner firm is allowed to acquire land).

#### (2) Laws, regulations, and procedures for setting up joint ventures between Zambian and foreign firms

No restrictions or regulations hinder joint ventures (i.e., any type of joint venture, such as a partnership, memorandum of understanding, or acquisition) between Zambian and foreign firms. The necessary procedure for a core venture to set up a new enterprise is to submit the related documents (e.g., business plans, financial statements, shareholder structure, and property lists) to newly register with PACRA and the Zambian Revenue Authority.

#### (3) Laws, regulations, and procedures for the acquisition of land by foreign firms

Zambia's property law stipulates that foreign firms cannot acquire land in Zambia unless they have Zambian partners that own a 75% share of the core venture.

However, this law has a mitigating measure. Foreign firms can acquire lands if they obtain a certificate of registration from the ZDA (this measure applies to acquisitions of equity and core ventures). The necessary procedure for obtaining a certificate from the ZDA is to present Form 2, a business plan, and registration papers of the Zambian Reserve Authority. Then, a certificate is issued within 30 days.

#### (4) Laws, regulations, and procedures for the exits of foreign firms

No restrictions or regulations hinder the exits of foreign firms<sup>73</sup>. Equity can be sold at market price at any time.

Intellectual property rights are secured for both foreign and domestic firms if they register with the patent office. No laws or regulations safeguard the contract farmers of foreign firms that exit. However, their contracts do have to be implemented during the contract period even if the firm exits before the end of the contract period.

### 6.8.2. Legislative framework related to agricultural investment in Zambia

The existing acts and regulations related to agricultural investments and environmental and social considerations in Zambia are summarized in Table 6-27.

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<sup>73</sup> If a foreign firm has debts to Zambian firms or investors when it exits, the firm is required to repay them.

**Table 6-27: Main acts and regulations related to agricultural investment in Zambia**

Acts, Regulations, etc.	Short Summary
✓ Zambia Development Act No.11 of 2006	✓ Promotes foreign investment for Zambia’s economic growth but also protects investors’ property from compulsory acquisition
✓ Plant Pests and Diseases Act 1959, amended in 1965 and 1994	✓ Developed for the eradication of pests and the prevention of the spread of pests
✓ Plant and Variety Seeds Act 1968	✓ Prescribes seed classes and standards, import and export rules, and so forth

Source: The Survey Team based on interviews with ZEMA, among others (2019)

In addition to the above, “To increase private sector participation in agricultural development” is objective No. 6 in the 2NDP, and strengthening the legal and regulatory framework is one of the main focuses of this objective, which includes the formulation and revision of the subsequent acts<sup>74</sup>. However, the new legislation and amended acts have not been confirmed by the National Assembly of Zambia as of now even though their target completion year was 2017<sup>75</sup>.

- ✓ Formulate new legislation, such as the Agricultural Marketing Act, the Livestock Development Act, and Regulations for the Dairy Development Act.
- ✓ Ensure the review and amendment of the Plant Breeder’s Rights Act, the Cooperative Society Act, the Fisheries Act, the Fertilizer and Feed Act, the Food Reserve Act, and the Agriculture Land Act.

### 6.8.3. Incentives for promoting agricultural investment in Zambia

ZDA Act No. 11 of 2006 offers a wide range of incentives in the form of exemptions and concessions for companies investing in a priority sector or product, as per the ZDA Act. The agricultural sector is one of the priority sectors, and preferential treatments for investors in this sector are listed below.<sup>76</sup>

- Conditions for receiving preferential treatment: Investors who invest no less than USD 500,000 in a priority sector are entitled to the following fiscal incentives:
  - ✓ Agricultural Sector: construction of crop and grain storage facilities, dams, and irrigation canals
  - ✓ Preferential Treatment
    - Zero percent import duty rate on capital equipment and machinery for five years

<sup>74</sup> Policy Monitoring and Research Center (n.d.), Analysis of the Second National Agricultural Policy 2016-2020

<sup>75</sup> The JICA Survey Team confirmed the current approval status of these acts based on the available information on the website of the National Assembly of Zambia (<http://www.parliament.gov.zm/acts-of-parliament?page=1>, accessed on September 9, 2019).

<sup>76</sup> ZDA (2018) Procedures and Guidelines for Certificate of Registration / MFEZ Permit

- Investment guarantees and protections against state nationalization
  - Free facilitation of applications for immigration permits, secondary licenses, land acquisition, and utilities
- In addition, the Zambia Revenue Authority (ZRA) published the following tax incentives for the agricultural sector.<sup>77</sup>
- Guaranteed input tax claims for four years prior to the commencement of production for taxable agricultural businesses
  - Zero rating of agricultural products and supplies when exported
  - Value-added tax (VAT) deferment on imports of some agricultural equipment and machinery
  - Income tax at a reduced rate of 10%
  - Farm improvement allowance of 100% on fencing and brick or stone walls and an allowance of 10 million ZMK for farms occupied by farm workers.<sup>78</sup> This incentive means that the investor is allowed to calculate depreciation on these items at a rate of 100% in place of the ZRA standard of 2%
  - Farm works allowance of 100% for the full cost of stumping and clearing, works for the prevention of soil erosion, boreholes, wells, aerial and geophysical surveys, and water conservation
  - Dividends paid out of farming profits are exempt from taxation for the first five years after the distributing company commences farming
  - A development allowance is given to any person who incurs expenditures when growing tea, coffee, or banana plants or citrus trees or similar plants or trees. An allowance of 10% of such expenditures is deducted in ascertaining the gains and profits of that business
  - No import duty on irrigation equipment, and reduced duty rates on imports of other farming equipment
  - Reduced customs duty of 5% on premixes, that is, vitamin additives for animal feed
  - Zero-rate for hammer mills with HS code 84361000, meaning that these goods or products are exempt from the payment of VAT

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<sup>77</sup> ZRA, Tax Incentives, [https://www.zra.org.zm/commonView.htm?ACTION\\_TYPE=showForms&RELEASE\\_TYPE=TXI](https://www.zra.org.zm/commonView.htm?ACTION_TYPE=showForms&RELEASE_TYPE=TXI) (Accessed on 18<sup>th</sup> July 2019) and hearing to ZRA.

<sup>78</sup> Perhaps, this means amortizing the depreciation 100% in the first year, but the publication by ZRA is silent.

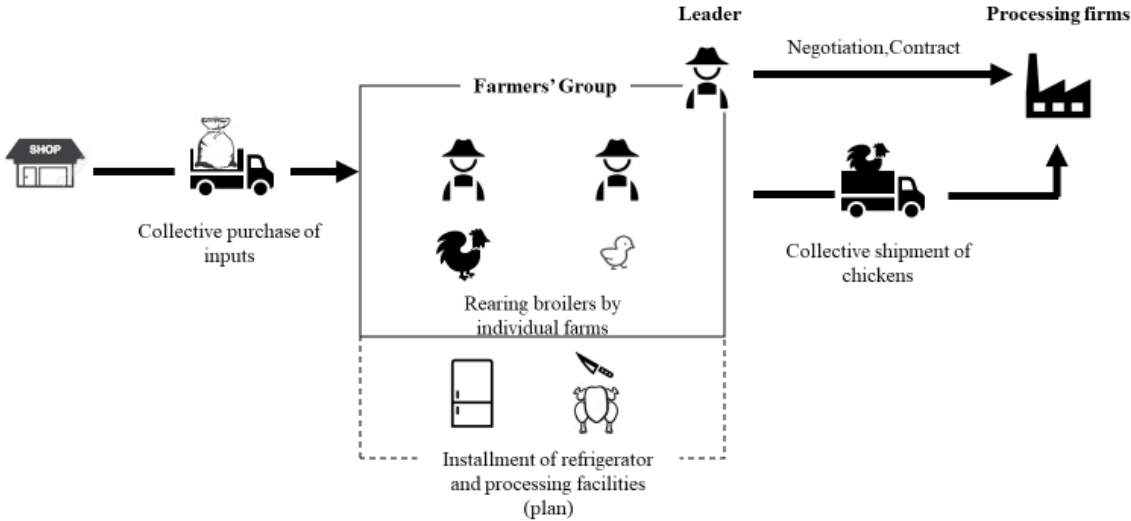
**6.9. Contract farming model**

(1) Broiler famers’ group at Tuzenje village in Chongwe Province

Many out-growers have formal contracts with large processors in the chicken meat VC, but the minimum production scale required to be an out-grower is 150,000 chickens, and, thus, it is difficult for small farmers to formally contract with processors. A group of small broiler farmers in Tuzenje village, however, established formal relations with processors by forming a farmers’ group.

There are 40 broiler farmers in the village, and they rear about 6,000 chickens in total. In 2015, they started collectively purchasing inputs as the first step in their group activities. Their input costs have decreased by 20% (mainly as a result of the decrease in transportation costs) as a result of making collective purchases. In 2016, they signed a contract with Crest Chicken, and since then, they have sold 1,500–4,000 chickens per month to Crest Chicken (Crest Chicken transports the chickens). The purchasing price of a chicken was ZMK 1.6 in 2016, but it is ZMK 1.4 as of June 2019. If the farmers were to sell their chickens on the open market, the price would be 20% higher, but they would have to bear the risk of unsold chickens.

The group is planning to install its own refrigerator and processing facilities so that they can process chickens from slaughter to packaging.



**Figure 6-25: Description of the farmers’ group at Tuzenje village**

Source: The Survey Team

(2) Tufwambe Cooperative at Kasisi village in Chongwe Province

This cooperative was founded in 2012 with the support of the Swedish International Development Agency for the collective sales of organic vegetables to supermarkets. The number of member households was about 100 when it was established, but membership is now 25

households, as many farmers in the village have shifted their major farming business to goat rearing.

The cooperative has had a formal contract with a major supermarket chains, Shoprite. Their collective sales results in 2018 are shown in Table 6-28.

**Table 6-28: Collective sales by Tufwambe cooperative in 2019**

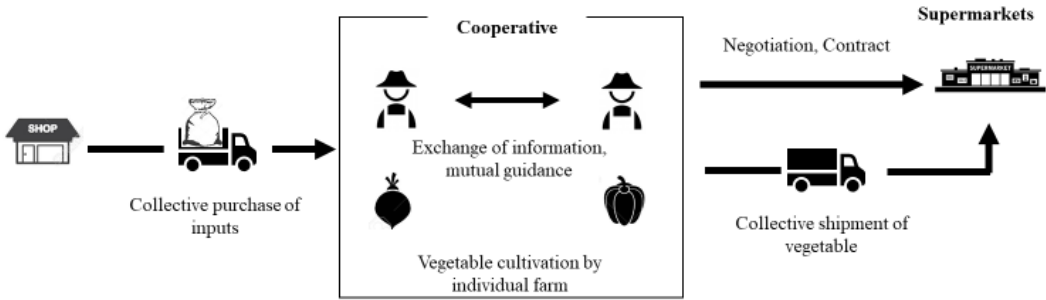
Rape	3,500 kg
Chinese cabbage	5,000 kg
Pumpkins	300 kg
Cabbage	6,000 heads
Spinach	1,500 kg
Eggplant	7,500 kg
Impur	3,000 kg
Beets	4,000 kg
Onions	1,500 kg
Garlic	2,000 kg

Source: Tufwambe cooperative

The group also makes collective purchase of seeds and organic fertilizer, which enables them to cut costs by 30%. Furthermore, they conduct mutual guidance and exchange information on farming techniques.

They constructed a chicken ranch using the profits from the cooperative and now manage broiler production as well.

As the demand for organic vegetables is quite high but the supply is limited, the cooperative’s bargaining power is relatively strong, leading to an increase in farming income. A major issue faced by the cooperative is the difficulty of procuring organic fertilizer.



**Figure 6-26 : Description of contract farming by the Tufwambe cooperative**

Source: The Survey Team



### (3) Community Market for Conservation (COMACO)

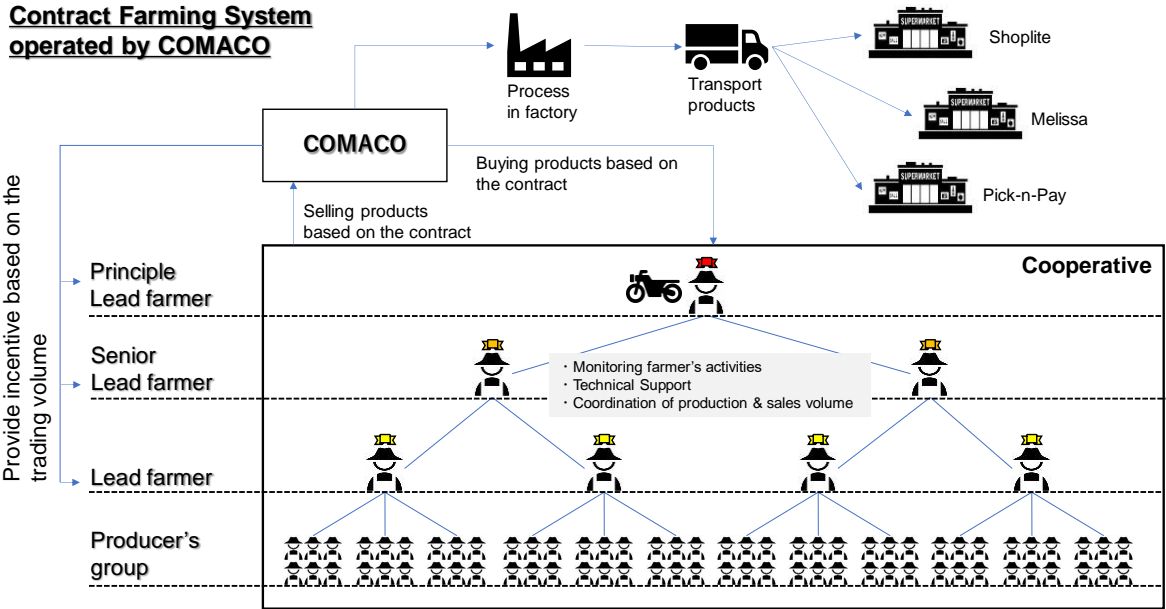
COMACO is a social enterprise established in 2003. The company has a corporate mission of discouraging wildlife poaching by proposing alternative means of livelihood based on farming to local habitual poachers. As of 2019, approximately 180,000 farmers have been supported by COMACO, and 12,000 farmers in Serenje District of Central Province have benefited from this assistance.

Farmers are organized by COMACO to promote efficient contract farming. Each group is composed of 15 to 20 producers, and several of these groups are further gathered to form a cooperative. Within a cooperative, elections are conducted to determine the managing team, comprised of the cooperative head, the treasurer, the principal lead farmer (the focal point of contact with COMACO), and supporting members, such as the senior lead farmer and the lead farmer. A motorbike is provided by COMACO to each principal lead farmer to facilitate monitoring the activities of all members in collaboration with of the senior lead farmer and the lead farmer in accordance with the “Better Life Guidelines” provided by COMACO. Each lead farmer is monitored annually by COMACO staff and is promoted to a higher lead farmer level according to a performance assessment. Discussions between COMACO and these structured cooperatives are organized before the cropping season to determine the items, specifications, and minimum volumes to be delivered to COMACO. For the establishment of soybean pricing, although the transaction price is entirely determined by the market price, the real purchasing price of soybeans is often higher than the selling price. A mutual agreement is drawn up when all collaboration conditions have been agreed upon by both parties. The delivery volume of each producer group is adjusted accordingly by the principal lead farmer based on the agreement with COMACO, and the expected yield of each producer group is provided by the lead farmer. During the crop cultivation period, the lead farmer is in charge of giving monitoring and cultivation advice to his or her producer group. The lead farmer is also responsible for reporting the expected yield of each group to the principal lead farmer. Based on this information, the principal lead farmer again adjusts the shipment volume from each producer group. For motivation purposes, COMACO has established a system that provides cash incentives to lead farmers based on their degree of contribution to successful contract farming. Currently, there are 10 principal lead farmers, 35 senior lead farmers, and about 200 lead farmers in Serenje District.

COMACO specializes in contract farming of rice, soybeans, and maize. The enterprise owns a rice mill that polishes and packages selected fragrant rice varieties, locally known as Kilombero, for sales and marketing. The company also manufactures “Yummy Soy,” a vitamin-reinforced mixture of milled maize and soybeans sold in major supermarkets, such as Shoprite, nationwide.

Incidentally, the contract farming model implemented by COMACO has many similarities to

an out-grower scheme promoted by the IITA in Nigeria. In this scheme, graduate students assume the intermediate role of consultants to promote stable contract farming between the IITA and farmers. In return, these students are remunerated financially for providing the farmers with the necessary production advice and crop delivery adjustment services<sup>79</sup>.



**Figure 6-27: Conceptual scheme of contract farming as conducted by COMACO**

Source: The Survey Team

**6.10. Concepts of PPP projects in Zambia**

Based on the findings on the VCs of soybeans, chicken, and cultured fish described in sections 6.2, 6.3, and 6.4, the Survey Team has conceptualized PPP projects targeting the development of each VC. These project concepts will be amended, and their feasibility will be assessed through various types of communication, including workshops in each target country involving the Survey Team and public and private entities that are interested in the project concepts. The final report will present the feasibility, obstacles, and way forward of each project concept.

**6.10.1. Soybean VC development projects**

Figure 6-28 shows draft ideas for PPP projects for soybean VC development in Zambia. The main issue is improving the productivity of small-scale soybean farmers. To this end, in addition to improving access to inputs and custom work services for small-scale farmers, technical

<sup>79</sup> Hearing to JIRCAS and the presentation document from IITA [https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwjD24f1-afjAhWD\\_aQKHRdEAwEQfjAAegQIARAC&url=https%3A%2F%2Fwww.naccima.com%2Fdownloads%2FNA%2FNA\\_CCIMA\\_IITA\\_BIP\\_Presentation.pptx&usg=AOvVaw2gAxxzrYj7fRVDb5SPDiIeBs](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwjD24f1-afjAhWD_aQKHRdEAwEQfjAAegQIARAC&url=https%3A%2F%2Fwww.naccima.com%2Fdownloads%2FNA%2FNA_CCIMA_IITA_BIP_Presentation.pptx&usg=AOvVaw2gAxxzrYj7fRVDb5SPDiIeBs)

guidance on soybean production and post-harvest treatment is needed. As a means of providing these services, private companies that provide custom work and conduct contract farming with small-scale farmers can implement investment and loan projects and technical cooperation projects to strengthen the capacity of small-scale soybean producers.

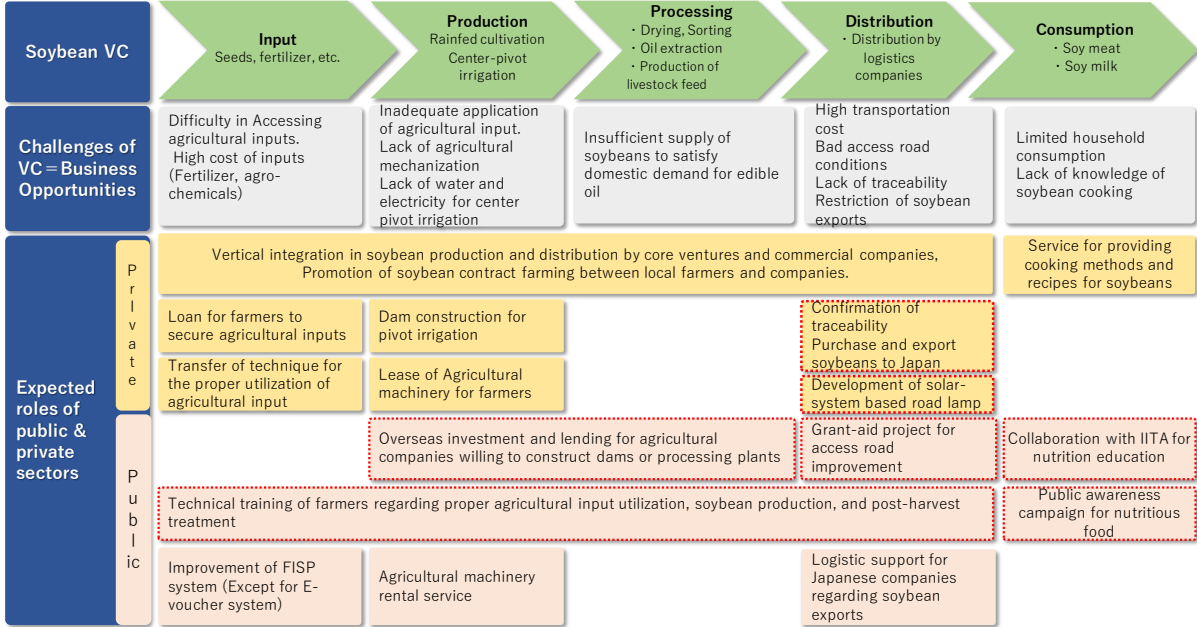


Figure 6-28: Soybean VC development sheet for Zambia

Source: The Survey Team

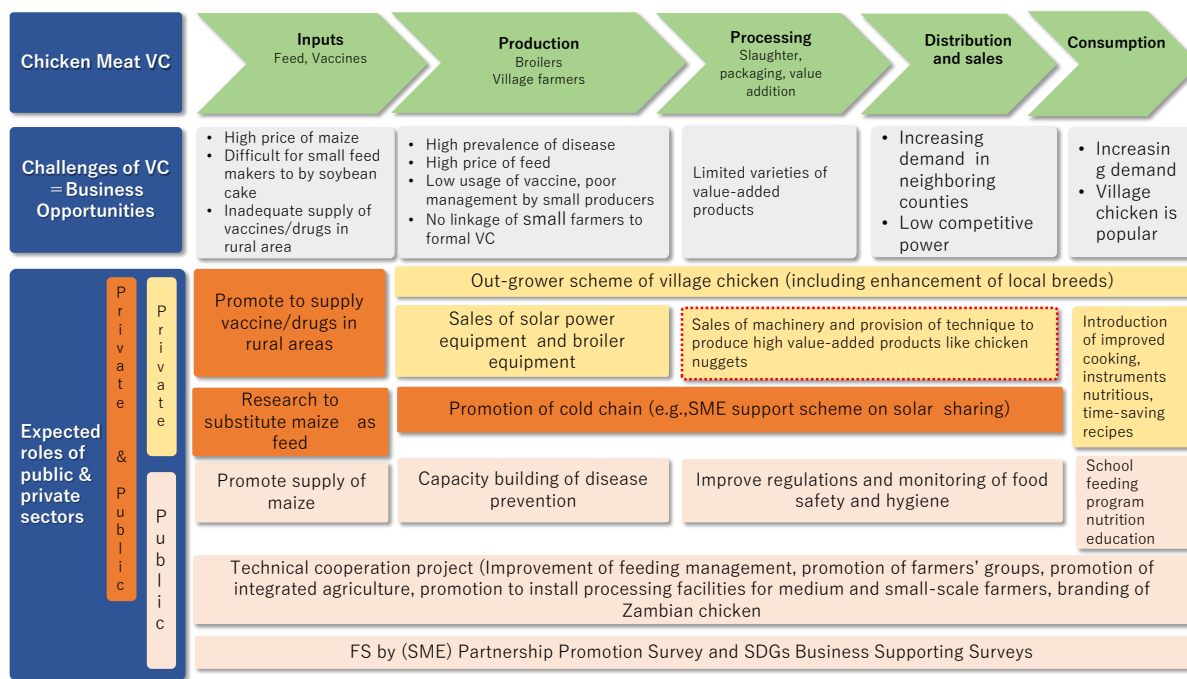
6.10.2. Chicken meat VC development projects

Figure 6-29 shows the business opportunities and potential projects for the chicken meat VC. To counteract the high price of feed, which is the major issue facing this sector, research projects to lower the production cost of feed (e.g., by substituting maize with cassava) would be useful.

To support small-scale producers, promoting the formation of farmers’ groups to help them gain access to formal distribution channels and constructing cold chains and processing facilities for them to utilize to strengthen their bargaining power would be useful. Additionally, sales of solar facilities to small-scale farmers to reduce fuel costs can be demanded of the private sector.

For large-scale processing firms, the introduction of machinery to create high value-added products (such as chicken nuggets) and necessary skills would be helpful for further developing their businesses.

As for the sales of village chickens, which are highly demanded in domestic markets, linking the producers to formal distribution channels by strengthening the breeds and promoting disease management and hygienic rearing would be beneficial.

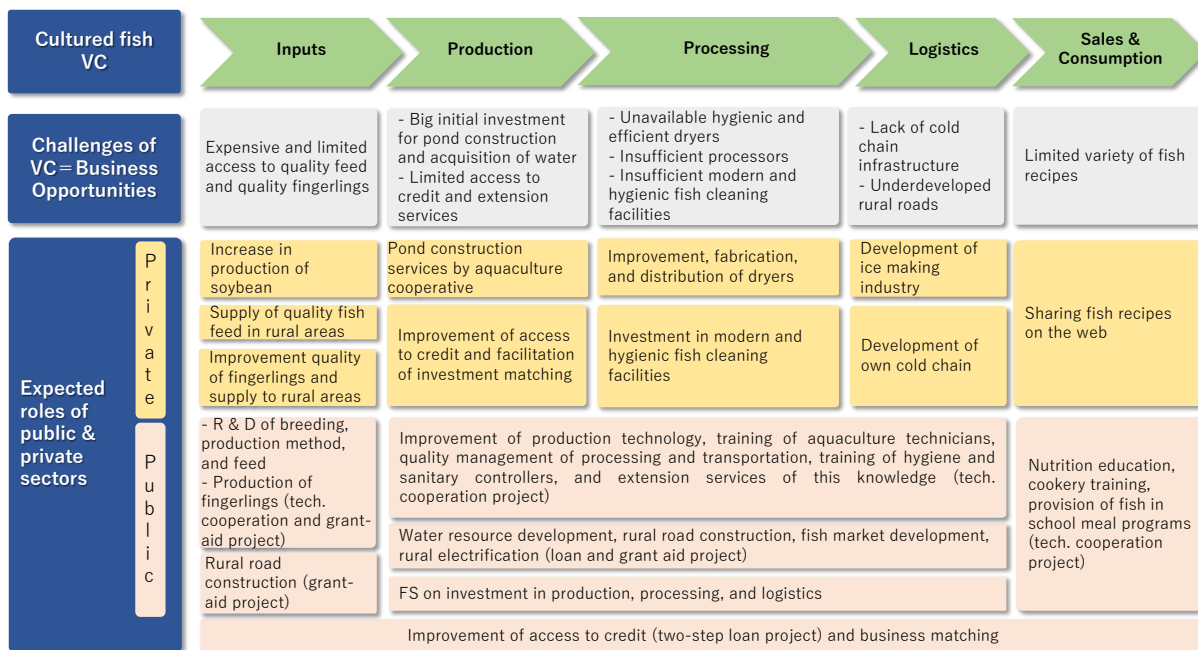


**Figure 6-29: Chicken meat VC development sheet for Zambia**

Source: The Survey Team

### 6.10.3. Cultured fish VC development projects

Figure 6-30 shows potential cultured fish VC development projects through PPPs. As shown in Table 6-19, the supply of fish in the domestic and regional markets is not sufficient, and production investments are greatly needed. Specifically, the production of quality fingerlings and fish feed is important, and it is necessary to develop commercial fish farms that can fully utilize those inputs. Toward this goal, research and development by public research institutes, technical assistance by extension agents, better access to credit, and so forth must be available. Apart from production, processing is relatively underdeveloped within the VC, so the extension of processing techniques and financial support schemes to start businesses are needed by processors. Additionally, as the consumption of fish per person has been increasing and fish is a quality foodstuff that is rich in protein, fish helps to improve Zambians' nutrition status. To facilitate this trend, interventions such as creating awareness of nutrients and fish recipes and facilitating fish consumption within school feeding programs can be considered.



**Figure 6-30: Cultured fish VC development sheet for Zambia**

Source: The Survey Team

