SDM: Case Report Niji Foods, Nigeria

Service Delivery Model Assessment

November 2019

Public report version

the sustainable trade initiative

NIJI FOODS NIG LTD.

NewForesight

Executive summary

Niji Foods is one of Nigeria's leading cassava processors. The SDM is designed as a block farmer out-grower program which seeks to meet the production needs of Niji Foods' starch facilities with secured raw materials while creating positive impact for cassava farmers. Niji Foods offers a range of services to farmers, including training, access to agro-chemicals, stems, mechanization and financing.

At farm level, the SDM has a considerable positive impact.

- During the first three years of the SDM, the service package for Segment 1 farmers (who are part of the out-grower scheme on the block farm) results in improved yields and scaled farm operations. The combination of the two drive up farmers' incomes to positive levels.
- As farmers are facing historically low prices in cassava and have difficulties accessing markets, this SDM provides farmers with a more secure business case in cassava by securing offtake while meeting farmers' needs across the crop cycle.

At SDM level, the business case including sourcing is positive and sustainable.

- Without sourcing, the SDM business case is negative because there are few revenue streams from the SDM. However, sourcing drives additional value in three ways: 1) Niji Foods sources cassava below market price; 2) cassava from block farmers has a higher starch content; and 3) Niji can increase its starch prices. The profits from sourcing are key to SDM profitability. Even under a range of price scenarios, including lower starch prices and higher cassava farm-gate prices, starch processing makes the SDM sustainable.

The main drivers of success for the SDM are:

- Profits from the modular set-up of the starch processing facility ensures stable profits: if the facility works as expected (full capacity), the SDM finances block farmers' land increases. If not, facility expansion and additional land clearing can be delayed without affecting profitability.
- The *block farm set-up enables Niji Foods to keep production at full capacity year round:* Niji Foods can control block farmers' activities and plan the timing of planting and harvesting to ensure there is a stable supply of raw materials for the starch facility year-round.

The main risks for the SDM are:

- As land size per farmer increases, so does the loan amount required to finance land clearing investments. A key risk is that banks will be unwilling to increase financing to cover fixed costs (such as land clearing)
- A positive SDM business case depends on additional value from sourcing. High cassava prices and/or low starch prices will significantly hit SDM profitability.
- Niji Foods fixes cassava prices for block farmers at below-market prices. If the market price for selling cassava rises beyond current historically low prices, this can hurt the incentive structure of selling cassava to Niji Foods.

The main improvement areas are:

- At present, block farmers' net income drops below zero for 3 years. To mitigate this, Niji Foods could change the repayment period for land clearing from 3 to at least 7 years. This would make farmers more financially secure and reduce default risk.
- Niji Foods could provide SDM services to Segment 1 farmers with privately owned property outside of the block farm and source this additional cassava. This would support net income increases for these farmers to improve their income resilience.
- Niji could benefit from a separate financing plan for land clearing investments. It could explore the opportunity of having international donors hedge local bank risk to incentivize banks to provide a 3-year loan with an interest rate close to the Anchor Borrowers' Program.

Learning questions

In this SDM study, a set of tailored learning questions were analyzed:

SDM Structure	**How can the SDM be scaled up in a cost efficient and profitable manner?**	• The key for scaling the SDM depends on two factors: 1) farmer production scalability; and 2) starch factory scalability. On the farmer side, increasing land size per farmer instead of increasing the number of farmers with a constant land size allows the SDM to decrease costs per MT of cassava sourced. On the factory side, the modular set-up of the starch facility gives Niji Foods the flexibility to scale up when production levels allow it.
Financing	**What (if any) level of subsidy is needed to sustain the SDM?**	• Segment 2 farmers (community farmers) do not generate profit for the SDM. With a starch facility working at full capacity, SDM costs of training these farmers can be covered by Niji Foods. However, Niji Foods could consider obtaining a subsidy to train Segment 2 farmers.
	Is starch processing line expansion economically sustainable?	• Starch line factory expansion is expected to be beneficial for Niji Foods as starch lines can quickly recover SDM costs. Two variables have a decisive influence: (1) the cassava price—which is currently historically low; and (2) capacity utilization—which is assumed to be 100%. Sensitivity analyses of these variables show the SDM is less profitable but still breaks even despite downward fluctuations.
	How do default rates affect SDM profitability?	• Loan losses make up an average of 9% of SDM costs. The risk-sharing agreement with banks means Niji Foods covers only 25% of default risk. If banks do not agree to financing expected higher loan sizes in this SDM, then Niji Foods will have to finance loans themselves and take on 100% of the risk. Default rates could be reduced by agreeing longer repayment periods.
Services	**Under what conditions is this SDM scalable?**	• To ensure stable cassava supply for the starch processing factory, it is essential to ensure high adoption rates of GAP and sufficient proximity to block farmers for oversight and control. • Banks needs to be willing to finance land clearing and over the years and give larger loans as land size per farmer increases.
Farmers	**How can this SDM deliver better social and economic returns for farmers?**	• Many block farmers have privately owned plots outwith the SDM. To take advantage of the spillover effects of improved GAP from the SDM. Niji Foods could source cassava from block farmers' privately owned land.
Application/Impact	**Is impact sustainable over the next ten years, both for farmers and Niji Foods?**	• The SDM is sustainable for Segment 1 farmers. but not for Segment 2 farmers. • The divergence in prices between selling to Niji Foods (at lower prices) or in the market could affect the incentive structure for participating in the block farm set-up.

IDH introduction

Importance of Service Delivery

Agriculture plays a key role in the wellbeing of people and planet. 70% of the rural poor rely on the sector for income and employment. Agriculture also contributes to climate change, which threatens the long-term viability of global food supply. To earn adequate livelihoods without contributing to environmental degradation, farmers need access to affordable high-quality goods, services, and technologies.

Service Delivery Models (SDMs) are supply chain structures which provide farmers with services such as training, access to inputs, finance and information. SDMs can sustainably increase the performance of farms while providing a business opportunity for the service provider.

A solid understanding of the relation between impact on the farmer and impact on the service provider's business brings new strategies for operating and funding service delivery, making the model more sustainable, less dependent on external funding and more commercially viable.

About this study

To accelerate this process, IDH is leveraging its strength as a convener of key public-private partnerships to gain better insight into the effectiveness of SDMs. IDH developed a systematic, data-driven approach to understand and improve these models. The approach makes the business case for service delivery to investors, service providers, and farmers. By further prototyping efficiency improvements in service delivery, IDH aims to catalyze innovations in service delivery that positively impact people, planet, and profit.

Thanks

IDH would like to express its sincere thanks to Niji Foods for their openness and willingness to partner through this study. By providing insight into their model and critical feedback on our approach, Niji Foods is helping to pave the way for service delivery that is beneficial and sustainable for farmers and providers.

Reading guide

In this document we present the findings of our study. You can navigate through the document by clicking on the index.

In this document you will:

- ✓ Understand what SDMs are
- ✓ Get a complete overview of the flows of goods, money and services in your SDM
- ✓ Analyze in depth all the implications of the different services
- ✓ Have a clear understanding of the financial performance of the SDM
- ✓ Get insights on the farmer business case

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Overview of SDM stakeholders and objectives

This chapter provides a general introduction to the SDM partner and other relevant actors, as well as the SDM objectives and context.

In this section you will:

- ✓ Key learning questions for this SDM analysis
- ✓ Learn the basics about the SDM operator
- ✓ Understand the value chain in scope
- ✓ Get an overview of the stakeholders involved in the SDM
- ✓ Understand the objectives of this SDM

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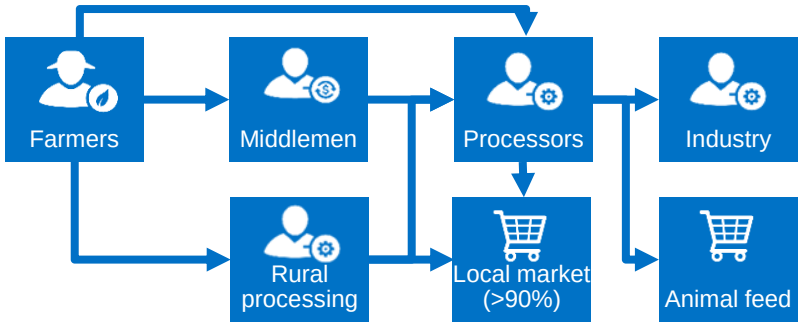
Context – Niji Foods and Nigeria

SDM Operator

- Niji Foods is one of Nigeria's leading cassava processors. Since 2011, Niji Foods produces a variety of cassava products for both food consumption and industrial uses to supply markets at home and abroad.
- Niji Foods is a subsidiary of Niji Group which supplies end-to-end agricultural solutions in Nigeria, including equipment, farm mechanization and agri-business education. Niji Foods is leveraging several of these business lines to support this SDM.
- In 2018, Niji Foods commissioned a starch production plant with daily input capacity of 50 MT cassava. By 2020, Niji Foods is aiming for full capacity utilization through direct sourcing from a dedicated supply chain.
- To supply the plant, Niji Foods guarantees offtake from smallholders participating in its out-grower scheme. The out-growers farm on a 700 ha block farm owned by Niji Foods and are supported with SDM services to enable them to grow quality cassava.

Overview of the cassava value chain in Nigeria



- Nigeria is the world's leading cassava producer. In 2016, Nigeria produced ~57.8 million MT of cassava, which is approximately 21% of global supply.
- Cassava is a crucial food staple in Nigeria, with 90% of production used for food consumption. The other 10% is processed into starch for use across a number of sectors, including energy, food and beverages.
- Smallholder farmers are the predominant growers of cassava which limits supply potential as yields var widely between 10 and 30 MT/ha.
- About two-thirds of the total production is located in southern Nigeria, a third in the north-central and the rest in other parts of the north.

Source: Niji Foods (2018), "IDH Commodities – Niji Foods Project Proposal Template"; FAO, 2013, Foundation for Partnership Initiatives in the Niger Delta (PIND), 2011. Cassava Value Chain Analysis in the Niger Delta

SDM Stakeholders and Entities Overview (1)

	Legal Status	Function (within this SDM)	Revenue model (within this SDM)	Participation incentive (within this SDM)
Financial Service Provider				
Sterling Bank	• Private limited liability company	• Participates in Anchor Borrowers Scheme • Provides credit to smallholders	• Interest payments	• Expand customer base • Reduce lending risk
Donor-funded Technical Service Providers				
the sustainable trade initiative	• Public private partnership	• Co-funds the SDM study	• N/A	• Promotion of innovation and improvement of smallholder business models
Buyers				
Nigerian Breweries Nestlé	• Public limited companies	• Offtakes starch	• Sales of consumer goods	• Supply security • Local sourcing commitments

SDM Stakeholders and Entities Overview (2)

	Legal Status	Function (within this SDM)	Revenue model (within this SDM)	Participation incentive (within this SDM)
Value Chain Partners (all subsidiaries of Niji Group)				
NIJI FOODS NIG LTD.	• Private incorporated company	• Processes cassava • Facilitates farmer access to SDM services	• Sale of processed cassava (starch) • Sale of cassava byproducts	• Secure steady supply • Improve starch quality • Smallholder impact
NIJI TRACTORS LTD.	• Private incorporated company	• Provides mechanization services	• Sale of mechanization services	• Expand customer base • Contribute to securing supply base across Niji Group operations
NIJI FARMS	• Private incorporated company	• Provides planting material	• Sale of planting material	• Expand customer base • Contribute to securing supply base across Niji Group operations

SDM Stakeholders and Entities Overview (3)

	Legal Status	Function (within this SDM)	Revenue model (within this SDM)	Participation incentive (within this SDM)
Value Chain Partners (all subsidiaries of Niji Group)				
NISA	• Private incorporated company / Agribusiness Institute	• Supports out-grower capacity development	• N/A	• Contribute to securing supply base across Niji Group operations • Smallholder impact
NIJI-LUKAS	• Private incorporated company	• Designs agricultural machineries and agro-processing equipment.	• N/A	• Expand customer base • Contribute to securing supply base across Niji Group operations

SDM Objectives

		Outcomes per Stakeholder		
		Farmer	**SDM operator**	**Investors**
CORE OBJECTIVES	1 Create a **commercially sustainable out-grower scheme**	• Improved income • Increased investment in farm operations	• Long-term supply security • Sales of high quality cassava starch	N/A
SECONDARY OBJECTIVES	2 **Improve the economic well-being** of smallholder farmers	• Improved income • Smoother cashflow	• Lower financing risk • Higher loyalty	• Lower financing risk • More bankable customers
	3 **Improve market linkages** for cassava farmers	• Secured offtake • Improved income	• Higher volumes of processed cassava • Higher revenues from quality starch sales	N/A

SDM Structure: Services, scale and organization of the SDM

This section provides information about the services delivered to the farmers, the number of farmers in the SDM and the way they are organized.

In this section you will:

- ✓ Get an overview of the services provided
- ✓ Get a breakdown of the dynamics and flows per service, as well as the delivery method, costs and impact
- ✓ Understand how they are sequenced and how they are related
- ✓ Get an overview of the SDM scale in terms of number of farmers
- ✓ Understand the farmer segmentation used for targeting

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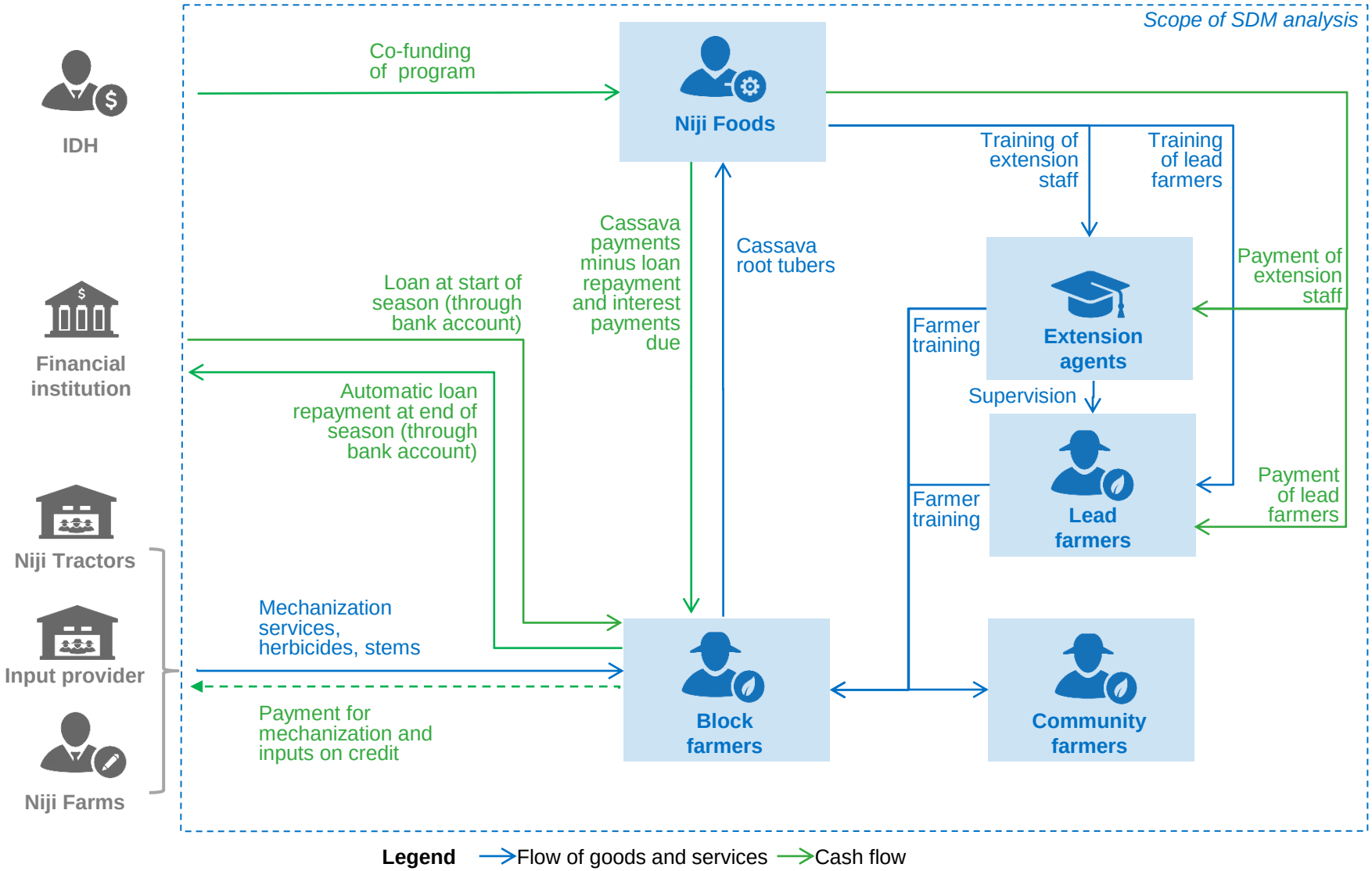
Farmer context – Oyo State (the SDM region)

Impact of the challenge on SDM farmers
0: very limited impact
5: high impact

Farmer context	Challenges	Impact	Measures taken by SDM operator
Agronomic	• The majority of cassava farmers in the region are smallholders with less than 5 ha and yields well below potential (10-15 MT/ha). Yields can rise up to 38 MT/ha with improved stems. • Few farmers use quality inputs which lowers cassava quality and market value. Drivers of low quality input use are lack of availability and finance, and unwillingness to invest in inputs given low offtake security in a volatile market. • Mechanization is not commonly used due to lack of access to services and unaffordability of tractors and equipment. This lack of use inhibits farm efficiency and scale.	▼ 4	• Niji Foods negotiates prices with suppliers to facilitate access to quality inputs for farmers at affordable prices. • Through its sister company Niji Tractors, Niji Foods enables farmers to access land clearing and other mechanization services with a loan structure designed around incoming farmer cashflow.
Economic	• Market price fluctuations caused by cycles of over- and under-supply results in a poor offtake structure for farmers. • Market value of produce is further affected by rapid post-harvest deterioration of cassava tubers. This constrains farmers' ability to wait and sell at higher prices as poorer quality cassava will either be rejected or gain a lower price. • Producers face constraints in accessing credit due to high cost of capital, lack of collateral, and perceived risks of small-scale lending. • The average smallholder has inadequate income from agriculture to sustain a farming household which, combined with lack of work opportunities outside farming in the region, makes it difficult for rural families to earn a decent income.	▼ 4	• Niji Foods guarantees to cover a portion of loan defaults for smallholder farmers in a risk-sharing mechanism with financial institutions to incentivize lending to smallholder farmers. • By guaranteeing to offtake 100% of cassava tubers from block farmers and doing so in a timely way, Niji Foods reduces market uncertainty and minimizes post-harvest losses. • Niji Foods supports farmers to expand their holdings and reach a minimal viable farm size that can better support them to attain a living income.
Social &	• Mealybug, green spider mite, mosaic virus and cassava bacterial blight are diseases affecting the cassava crop. These undermine the productivity of smallholder farmers. • Cassava grows on dry and infertile soils and further depletes the soil.	▼ 3	• Niji Foods trains farmers in good agricultural practices and provides access to timely inputs that can enable farmers to tackle pests and diseases and minimize productivity losses.

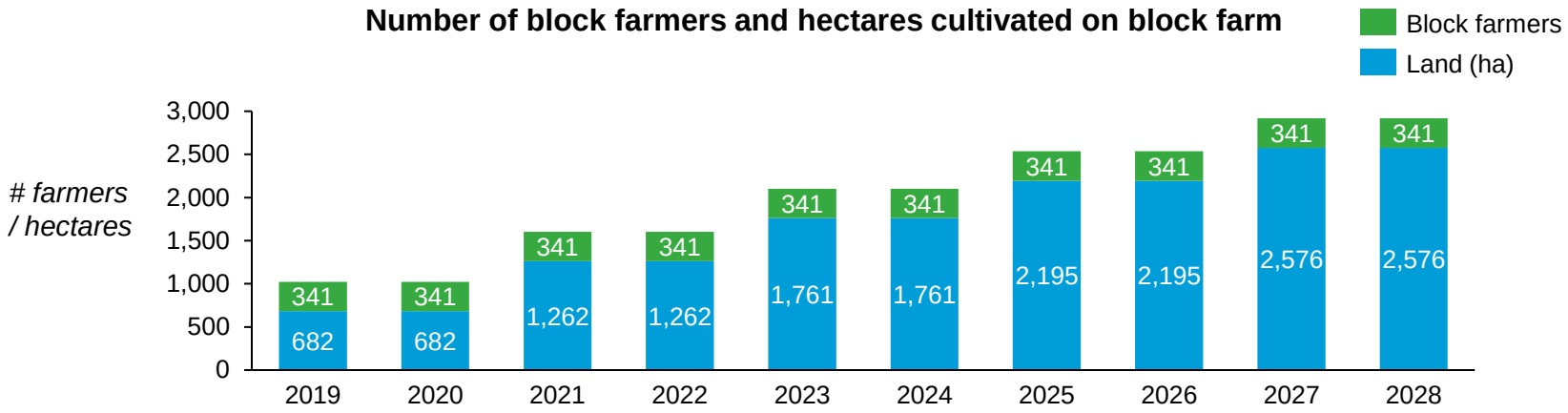
Sources: Dalberg (2015). "Market Opportunities for Commercial Cassava in Ghana, Mozambique and Nigeria; FAO (2018). Cassava Development in Nigeria; Niji Foods (2018), "IDH Commodities – Niji Foods Project Proposal Template Otuniaya, O. (2007); "Access to Informal Credit and its Effect on Cassava Production"; .

SDM Services and Revenue Flow Overview



Source: Niji Foods (2018). *IDH Project Plan*

Scale of out-grower scheme (focus of this SDM)



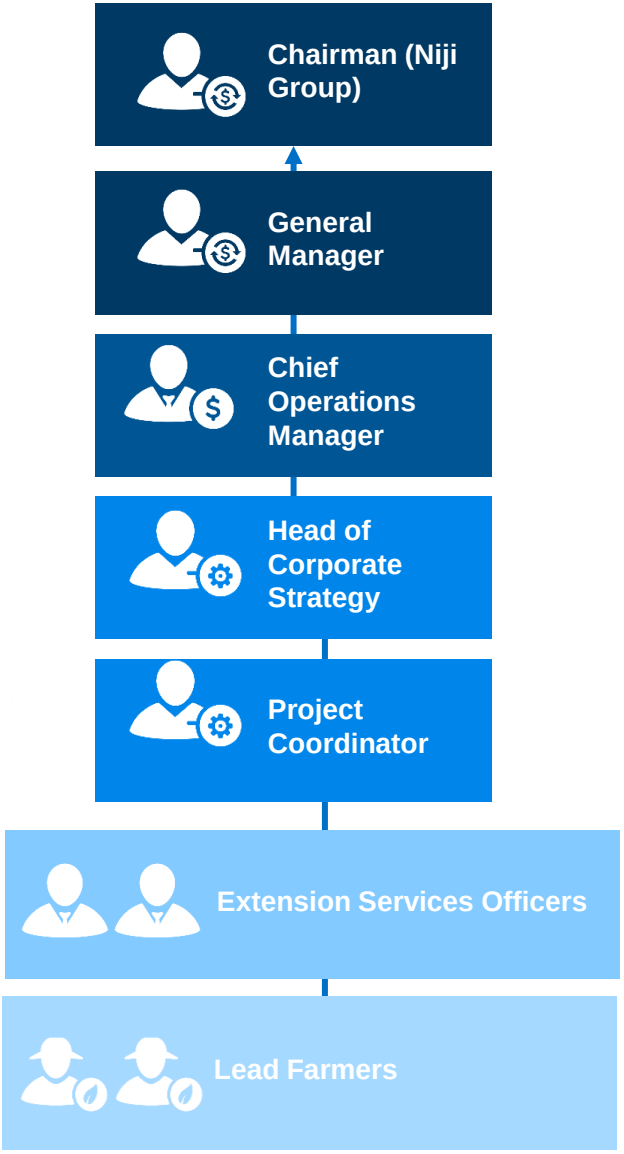
Starch lines (#)	1	2	3	4	5
Starch line(s) capacity (MT)	15,000	30,000	45,000	60,000	75,000
Land (ha)	682	1262	1,761	2,195	2,576

2018-19: Start of SDM
Niji Foods clears 700 ha land for the out-grower scheme. 341 farmers are allocated plots of 2 ha on the block farm. From 2019 onwards, block farmers receive a full package of services, including training, mechanization, access to herbicides and stem provision.

2020 - 2024: Scale-up phase
Secured offtake from block farmers continues to meet supply needs for the Niji Foods starch line. A small amount of tubers sourced from Niji Farms' commercial farm acts as a buffer. Niji Foods increases its starch processing capacity with the addition of 2 new factories. Block farmers increase land size to 5 ha.

2024-2028: Program continuation
Stable supply is secured and Niji Foods continues to increase its factory capacity by expanding to 5 factories by 2028. Block farm expansion occurs in line with capacity needs and results in an increase of the plots on the block farm to 8 ha by 2028.

Organizational structure



- Responsible for strategic development of Niji Foods within the overarching vision of Niji Group.
- Represents Niji Foods internally within Niji Group and externally.

- Responsible for day-to-day management of business operations
- Ensures close liaison with the Chairman

- Oversight of Niji Foods' operations, including administration, financial planning, and correspondence management.

- Responsible for Niji Foods' business initiatives and company sustainability.

- Manages operations of the SDM, including the oversight of collaboration with service providers and smallholder farmers.

- Conducts trainings to block farmers and community farmers.
- Coordinates input supply, and provide logistics and operations support for service delivery to block farmers.
- Responsible for data collection, supervision and management.

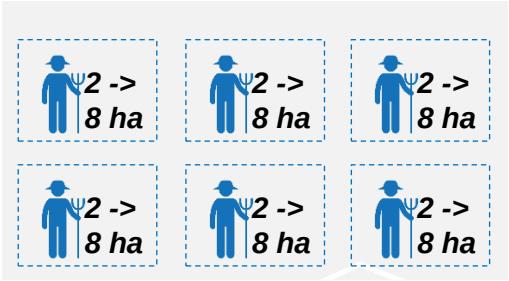
- Supports clusters of out-growers.
- Conduct trainings to block farmers and community farmers, under supervision of extension services officers.

How farmers are organized in this SDM

Niji Foods is developing a dedicated supply chain to meet its starch processing needs by sourcing cassava with guaranteed offtake from farmers on its block farm. The size of the block farm will increase in line with sourcing needs for the planned expansion to 5 starch lines over the next 10 years. Niji Foods will also give limited training to 7,000 community farmers (without sourcing commitments) as part of the SDM. Cassava from Niji Foods' commercial farm acts as a buffer in case of a supply shortfall.

Block farmers
(Segment 1)

Main focus of the SDM

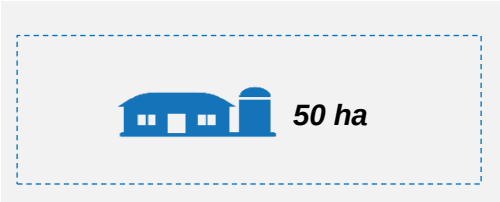


Over the course of the SDM, the block farm expands while the number of farmers (341) stays constant, resulting in an increase of land size per farmer. All SDM services are provided to block farmers on credit from year 1 onwards. Given Niji Foods' supervision on the block farm, it can ensure high loyalty and adoption rates of good practices to optimize productivity, ensure quality produce, and manage the harvesting cycle of block farmers to suit the needs of the starch lines.

Community farmers
(Segment 2)

Niji Foods will train a total of 7,000 community farmers over the course of the SDM. 1,400 farmers will be trained per year in the first two years, which will decrease to 500 per year from 2022 onwards. Niji Foods has no sourcing commitments to these farmers.

Niji Farm
(Segment 3)



Niji Group owns a commercial 50 ha farm as a "buffer" source of cassava tubers. This additional supply provides security to Niji Foods of a stable minimum supply and lowers the risk of sourcing only from smallholder farmers.

Farmer segmentation

The main target for the SDM is Segment 1 farmers who are part of the block farmer out-grower scheme. These farmers receive all services provided by Niji Foods, which includes training and access to inputs, planting materials, finance and mechanization. The secondary target is Segment 2 farmers who farm in neighboring communities. These farmers receive (limited) training only.

Segments

*Segments are distinct groups of SDM beneficiaries that differ on **farm characteristics**[1)] and/or **services received***

For each segment:
- *the estimated **SDM impact at farm level** is shown on slide 25*

		Baseline	Block farmer *Segment 1*	Community farmer *Segment 2*	Niji-owned Farm *Segment 3*
Characteristics	**Productivity (start year)**	15 MT/ha	22 MT / ha	15 MT/ha	33 MT/ha
	Farm size start year	2 ha	2 ha	2 ha	50 ha
	Land type	Farmer-owned	Niji-owned	Farmer-owned	Niji-owned
	Farmer organization	N/A	Groups of 25 farmers with 1 lead farmer	Groups of 25 farmers with 1 lead farmer	N/A
Services	**Training**	N/A	Regular training	One-off training	N/A
	Inputs	N/A	Herbicides	N/A	N/A
	Planting material	N/A	Improved stems	N/A	N/A
	Finance	N/A	Loan covering all expenditures	N/A	N/A
	Mechanization	N/A	Land clearing, ploughing and ridging	N/A	N/A

Overview of Services

Farmer training

- Niji Foods trains extension staff who conduct trainings of 7 modules for cassava farmers on the block farm. Extension staff also conduct one-off trainings for farmers in neighboring communities.
- Extension staff train and supervise Lead Farmers who also provide training to farmers.

Input provision

- Through its sister company Niji Farms, Niji Foods negotiates provision of affordable, quality herbicides.
- Farmers pay for herbicides on credit via their bank account. Loan repayment to the bank occurs through automatic deductions from cassava revenues.

Mechanization services

- Niji Foods pays for land clearing on behalf of block farmers at the start of the scheme. Farmers repay land clearing to Niji Foods over a 3-year period.
- Niji Foods' sister company Niji Tractors provides mechanization services. Farmers pay on credit via their bank account.
- Loan repayment to the bank occurs through automatic deductions from cassava revenues.

Stem provision

- Through its sister company Niji Farms, Niji Foods provides improved stems to enable farmers to grow quality cassava.
- Farmers pay for stems on credit via their bank account. Loan repayment to the bank occurs through automatic deductions from cassava revenues.

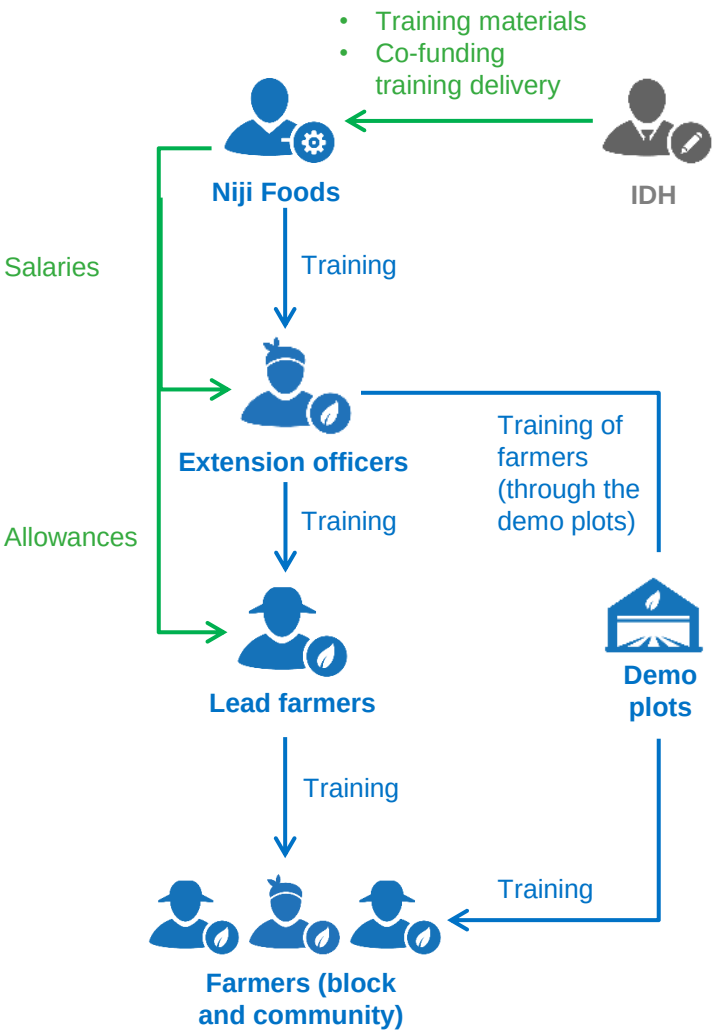
Access to finance

- Niji Foods facilitates credit access to smallholders through a risk-sharing agreement (Anchor Borrowers Scheme).
- The bank supports farmers to set up bank accounts and gives farmers a loan for all cassava farming costs they incur at the start of the season.
- The bank reclaims the loan principal plus interest from incoming revenues to farmers' bank accounts.
- Niji Foods covers 25% of farmer defaults.

Other services

- Niji Foods enables farmers to afford additional services associated with cassava farming: land rent, transportation (from the farm to the starch plant) and utilities.
- Farmers pay for these services on credit via their bank account.
- Loan repayment to the bank occurs through automatic deductions from cassava revenues.

Detailed overview of **training**



Legend
- Flow of goods and services
- Financial / payment flows

Description / Methodology

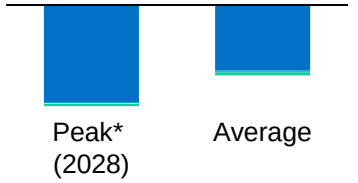
- Training is done at three levels: 1) training of extension officers, 2) training of lead farmers, and 3) training of out-growers and community farmers.
- Both farmer segments receive theoretical and in-field training. They are trained on best practices of cassava cultivation, including farm management, land preparation, planting and harvesting. Extension officers and lead farmers supervise out-growers at each stage of cultivation.
- Demo plots have been set up by Niji Foods in various communities to provide in-field training and showcase GAP (good agricultural practices).
- Training of trainers and lead farmers is done by Niji Foods.
- Out-growers are trained for 5 years, although to a lesser degree in later years. Community farmers are trained for 1 year. New community farmers are trained each year.

Service costs (from the perspective of Niji Foods)

Description
- Niji Foods pays monthly salaries to the extension officers, allowances to lead farmers (for costs incurred to organize training) and covers costs to set up and run the demo plots.

Drivers
- Number of extension officers.
- Transportation of extension officers

Training expenses per farmer per year (NGN)

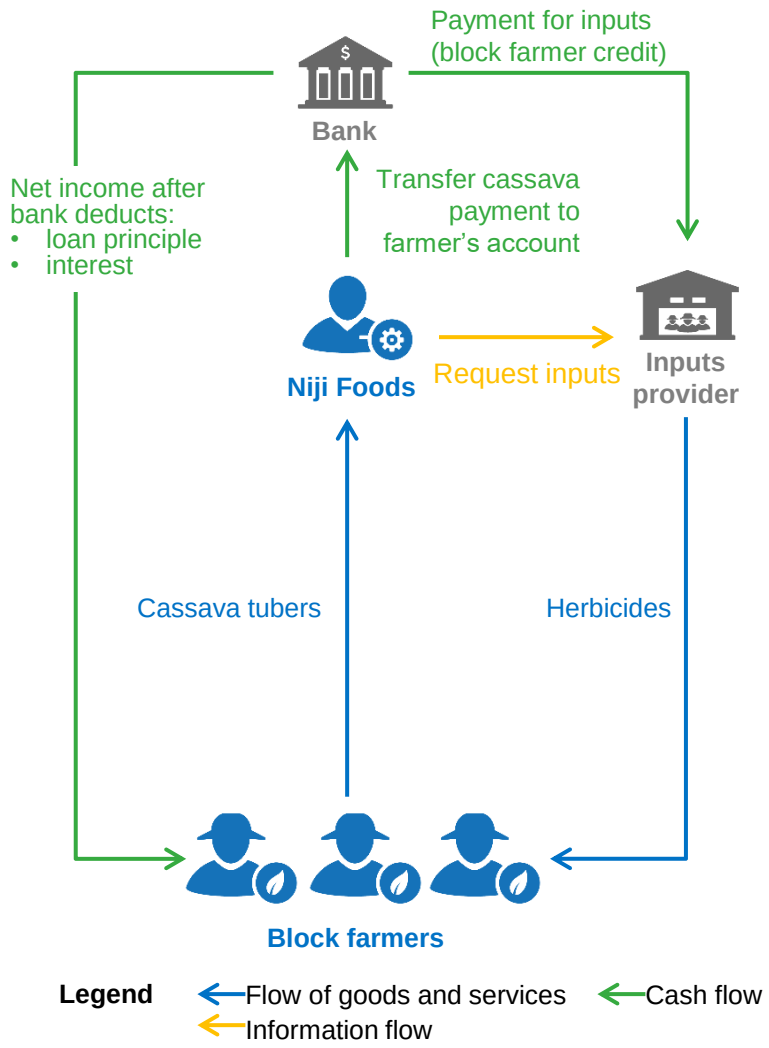


*Peak year refers to the year in which net costs are higher (or net income lowest)

Impact

- Block farming allows Niji Foods to monitor and continuously train out-growers to ensure GAP adoption. This increases the likelihood of higher yields and incomes. Community farmers trained on a one-off basis are not monitored in a controlled way, and so expected impact is not as high.
- Yields are expected to increase by more than 47% for out-growers and 20% for community farmers.

Detailed overview of **inputs (herbicides)**



Description / Methodology

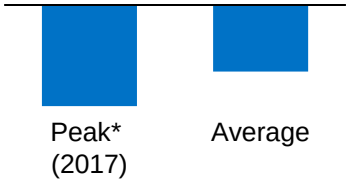
- Niji Foods consults farmers to establish the herbicide needs for their farms. Niji Foods agrees with the input provider on the price of inputs per farmer and the input provider delivers the required herbicides to the out-growers.
- The bank extends a 1-year loan to the out-growers through the Anchor Borrowers Program (ABP) to cover the payments for the services they receive. The input provider is paid by the bank using the credit line of the out-growers.
- Out-growers sell their cassava harvest to Niji Foods. Niji Foods deposits the corresponding payment to their individual bank accounts. The bank deducts the loan and interest from that amount.

Service costs (from the perspective of Niji Foods)

Description
- No cost impact for Niji Foods. The service provider is paid on a cost recovery basis by using the farmers' credit lines.

Drivers
- Herbicide costs
- Farm acreage

Inputs expenses per farmer per year (NGN)

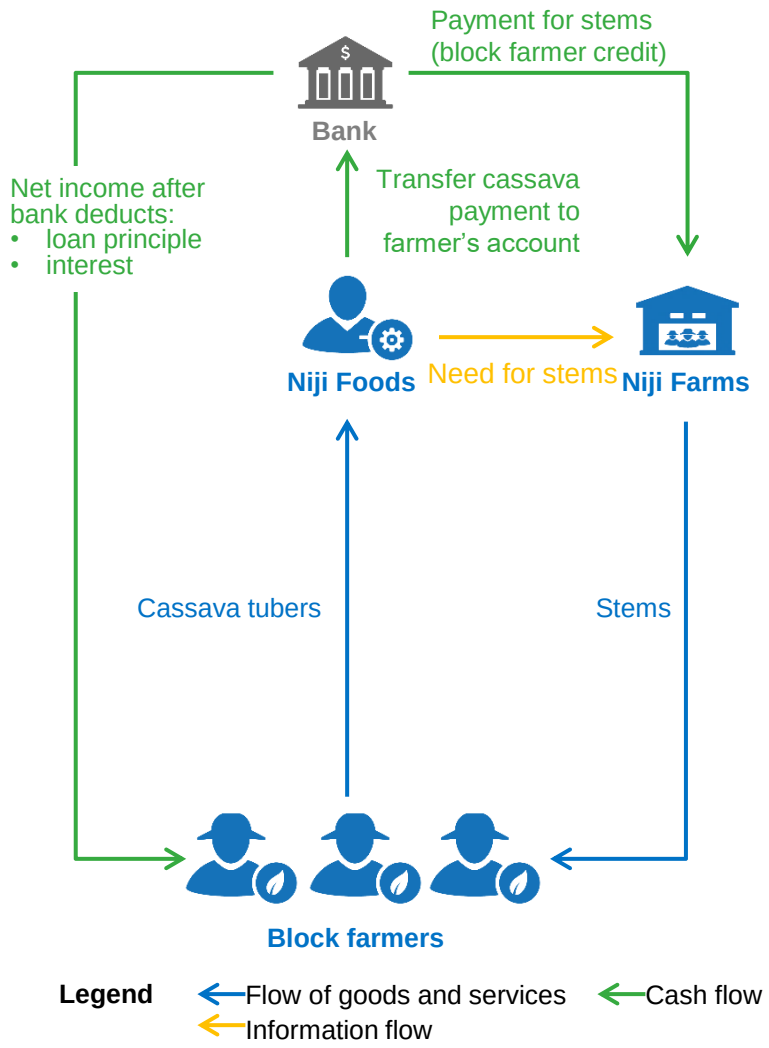


*Peak year refers to the year in which the net costs are highest (or net income lowest)

Impact

- Access to herbicides enables farmers to increase their yields as the correct application of herbicides enables them to produce more cassava on the same plot size.
- Higher cassava yields enable Segment 1 farmers to improve their net incomes.

Detailed overview of **planting material (stems)**



Description / Methodology

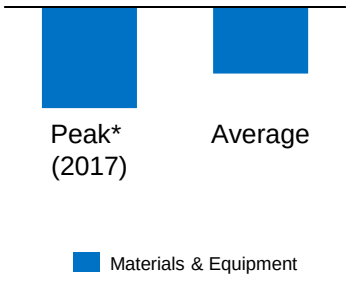
- Niji Farms delivers bundles of stems to the out-growers on a cost recovery basis. Each out-grower receives 50 bundles/ha the first year (2019) and 25 bundles/ha annually afterwards. This number drops from the first year for all subsequent years because block farmers will collect stems from their plots and use them for planting after each harvest.
- The bank extends a 1-year loan to the out-growers through the Anchor Borrowers Program (ABP) to cover the payments for the services they receive. Niji Farms is paid by the bank using their credit line of the out-growers.
- Out-growers sell their cassava harvest to Niji Foods, who deposit the corresponding amount to their individual bank accounts. The bank deducts the loan and interest from that amount.

Service costs (from the perspective of Niji Foods)

Description
- No cost impact for Niji Foods. The service provider is paid on a cost recovery basis by using the farmers' credit lines.

Drivers
- Stem availability and stem price
- Farm acreage

Stem expenses per farmer per year (NGN)

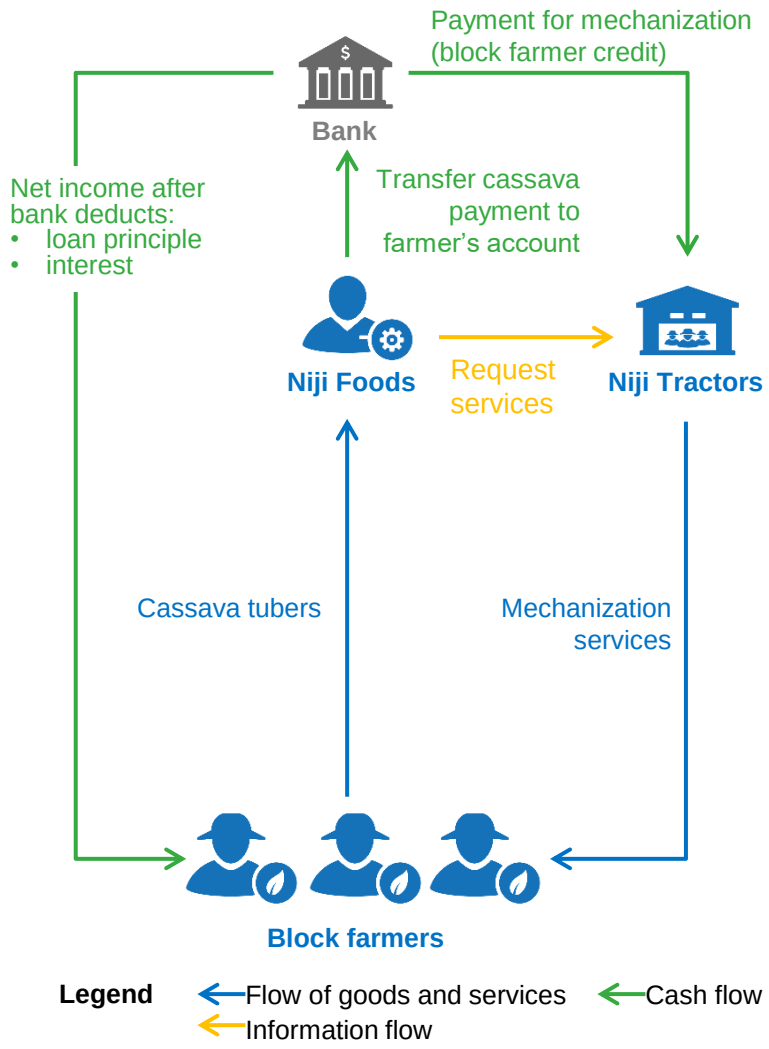


*Peak year refers to the year in which net costs are highest (or net income lowest)

Impact

- Productivity increase as the stems provided are for higher-yield cassava varieties.
- Higher income for out-growers due to higher yields and reduced post-harvest loss with the improved cassava varieties.

Detailed overview of **mechanization**



Description / Methodology

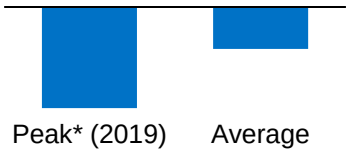
- Niji Tractors perform mechanization services for the out-growers consisting of land clearing, ploughing (1st and 2nd) and ridging. Land clearing has already been done for the whole block farm for the first year. This is repaid by out-growers over a 3-year period as this is a significant cost. The other services are performed during the production cycle and repaid within a year.
- The bank extends a 1-year loan to the out-growers through the Anchor Borrowers Program (ABP) to cover the payments for the services they receive. Niji farms is paid by the bank using their credit line of the out-growers.
- Out-growers sell their cassava harvest to Niji Foods, who deposit the corresponding amount to their individual bank accounts. The bank deducts the loan and interest from that amount.

Service costs (from the perspective of Niji Foods)

Description
- Land clearing occurs every other year. Niji Foods pays for land clearing upfront and farmers repay in 3 years. Ploughing and ridging are paid upfront by the bank.

Drivers
- Block farm expansion

Mechanization expenses per farmer per year (NGN)

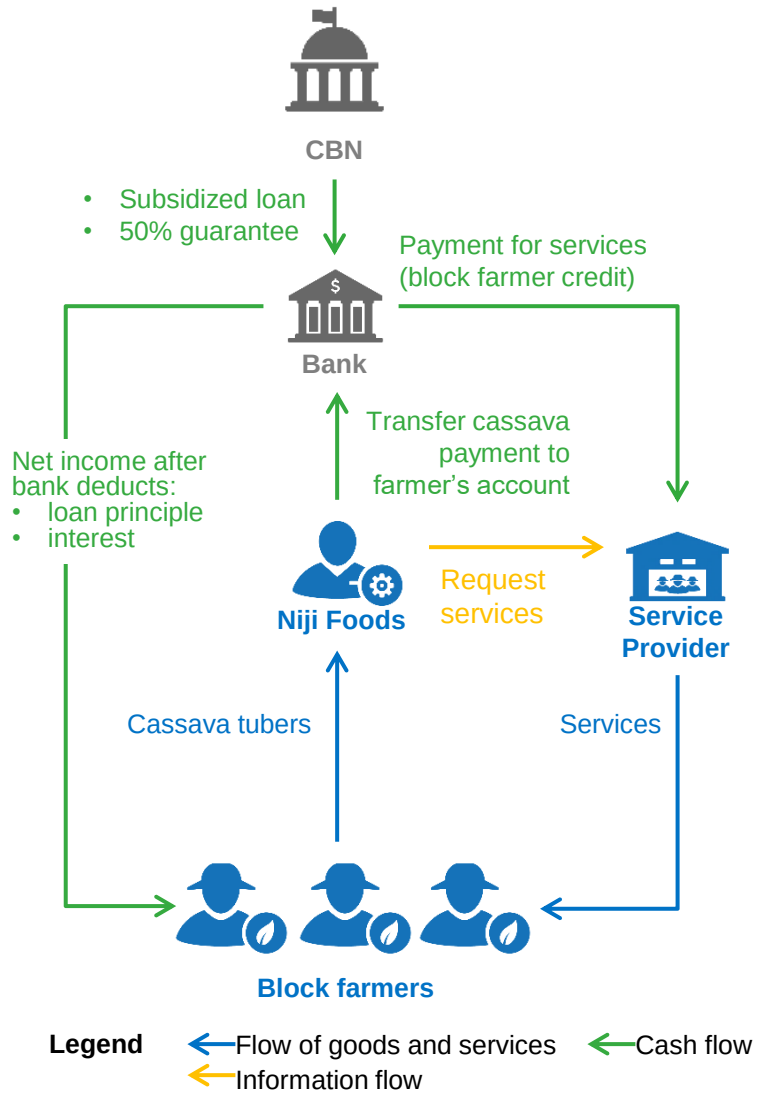


*Peak year refers to the year in which the net costs are highest (or net income lowest)

Impact

- Benefiting from the full range of mechanization services allows block farmers to access the land and increase their productivity.
- Mechanization reduces (non-mechanized) labor costs.

Detailed overview of **access to finance**



Description / Methodology

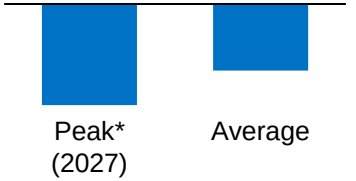
- Through the Central Bank of Nigeria (CBN)'s Anchor Borrowers Program (ABP), the Bank (the financial services provider) is able to provide loans to out-growers at a 9% annual rate.
- Niji Foods facilitates the opening of bank accounts for the out-growers, and an equal pre-agreed loan amount is made available to all of them for a year to cover the costs of all services that they receive. Service providers are paid by using the out-growers' credit lines.
- Out-growers sell their cassava harvest to Niji Foods, who deposit the corresponding amount to their bank accounts. The bank deducts the loan and interest from that amount. Any excess money in the account constitutes the out-grower's net income, after repayment of all services.
- In case of default not due to force majeure, the guarantee offered by the different actors are (as a percentage of the total default amount): the out-grower 5%, CBN 50%, Niji Foods 25%, the bank 20%.

Service costs (from the perspective of Niji Foods)

Description
- Niji foods bears 25% of the default costs to facilitate access to finance for out-growers.

Drivers
- Default rates.
- Acreage per farmer

Financing costs per farmer per year (NGN)



*Peak year refers to the year in which the net costs are highest (or net income lowest)

Impact

- Access to finance enables the farmers to finance farm services, thereby allowing them to increase investments in the farm to increase productivity and professionalization.
- Niji Foods benefits from increased loyalty rates which results in a reliable source of quality cassava tubers.

Farm-level impact

This chapter presents the analysis at farmer level.

In this section you will:

- ✓ Understand the P&L of the farmers in the SDM according to their segment
- ✓ Understand how relevant factors (e.g. market price, quality, input adoption, yield) impact the farmer business case

Overview of SDM stakeholders & objectives

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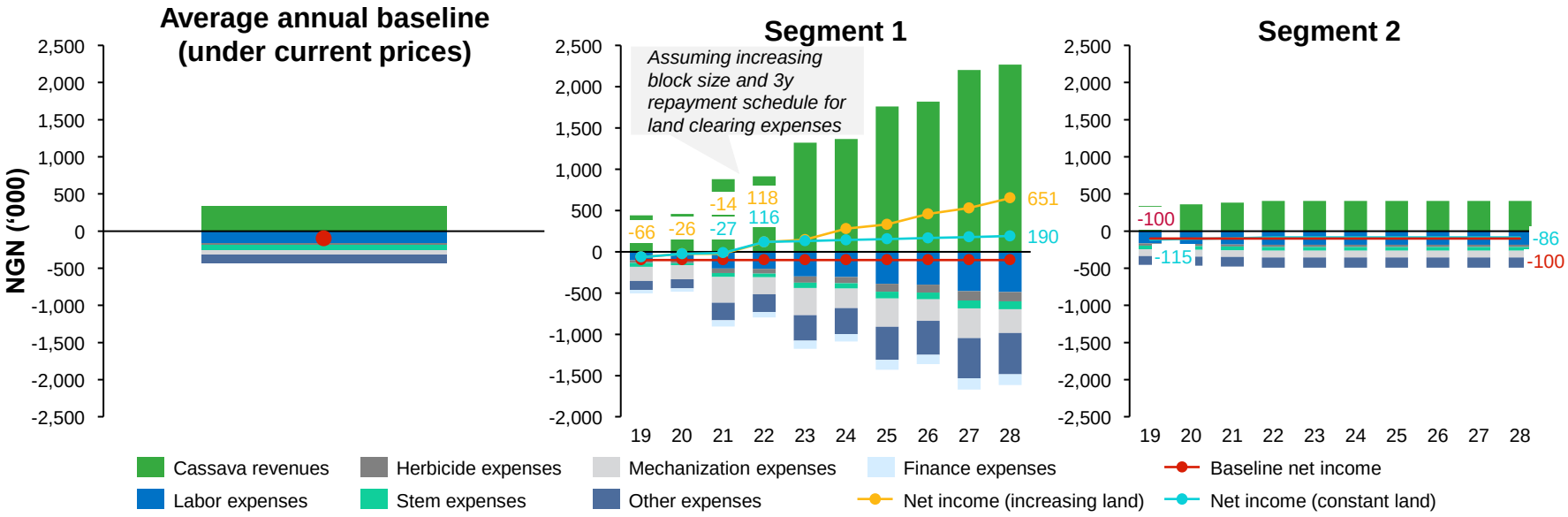
Farm P&Ls: overall impact



Economic sustainability at farm level

The average annual income for a baseline farmer in the SDM is **-99,806 NGN** (-275 USD). Total revenues derived from a low yield of 15 MT per ha cannot outweigh high production costs. In other words, farm-gate price is lower than cost of production.

Segment 1 farmers with the full service package deliver much higher yields (almost double the baseline by 10th year) and have a significantly higher net income than baseline and Segment 2 farmers. When land size is kept constant, average net income in the 10th year is around 290% higher than the baseline, and when land per farmer increases from 2 to a peak of 8 ha, net income rises to around 750% higher than the baseline **(650,764,000 NGN)**. This is despite baseline and Segment 2 farmers receiving a 13% higher farm-gate price.

Importantly, during the first 3 years of the SDM, Segment 1 farmers' net income drops below zero. This is because of land clearing repayment costs in three annual installments with 10% interest, costing 55,000 NGN per ha. As farmers increase farm size in later years, the benefits of scaled farm operations outweigh land clearing investments for new land.

Segment 2 farmers supported in the SDM with training deliver around 19% higher yields than baseline farmers from the 4th year onwards. However, net income still stays negative for these farmers throughout. For the first two years, they generate less net income than baseline farmers because of cost implications from implementing GAP, especially additional second ploughing.

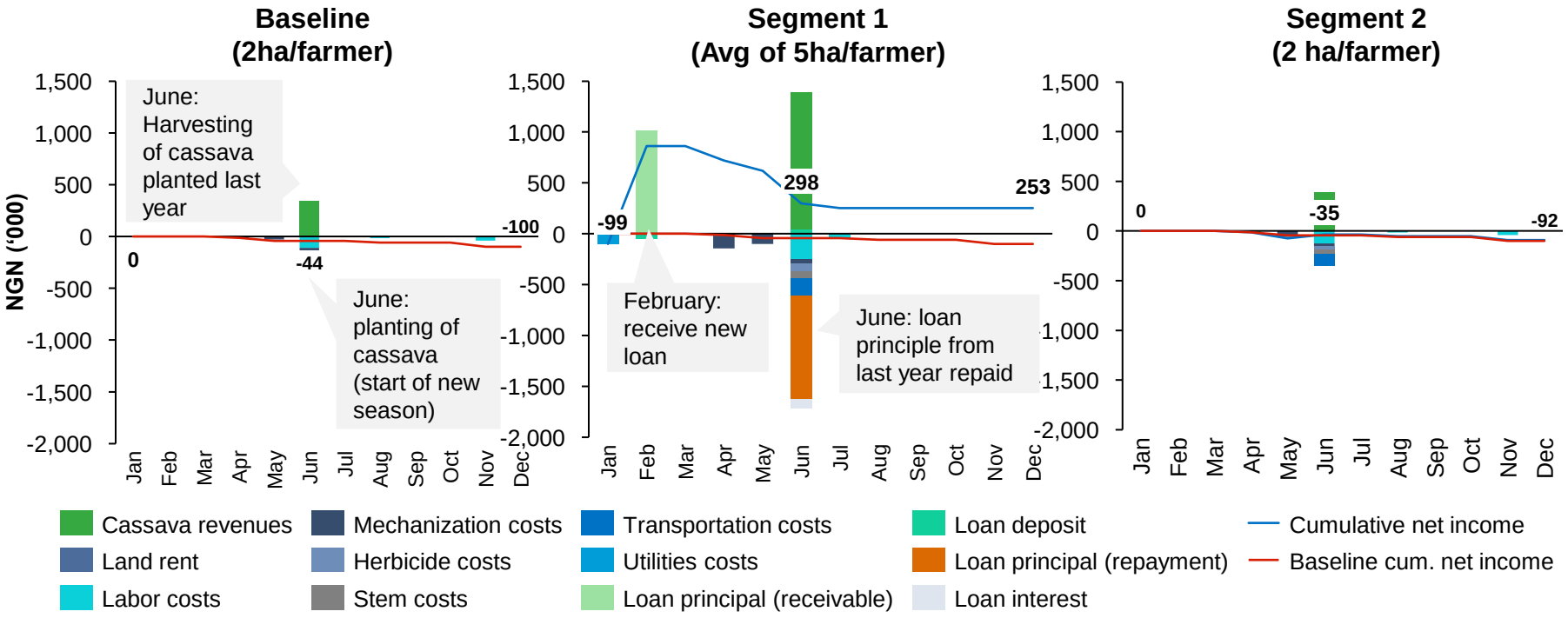
Main revenue drivers

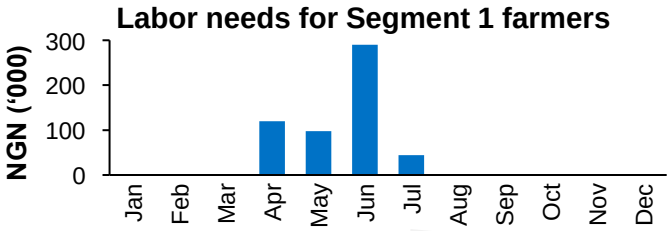
- **Yields:** Segment 1 farmers have a higher starting yield of 22 MT/ha which increases to 30 MT/ha over the SDM due to training and timely access to quality inputs (compared to baseline and Segment 2 peak yields of 15 and 18 respectively)
- **Farm size:** Segment 1 farmer land size increases from 2 ha to a peak of 8 ha over the SDM.

Main cost drivers

- **Land clearing:** Segment 1 farmers have an additional cost of mechanized land clearing (165,000 per hectare, repaid over 3 years).
- **Labor:** Cassava is a relatively labor intensive crop, with labor expenses making up 50% of costs.

Average farm cash flow cycle during 2019-2028





Although the majority of costs are incurred during the planting month of June, land clearing and land preparation starts before the season in April/May. Therefore, the loan (received in February) is crucial for Segment 1 farmers to afford mechanization services.

Discussion

- To show what an average financial year would look like for all segments, the monthly cashflows averaged over 10 years of the SDM has been depicted.
- In reality, the bank pays the service providers and the farmer repays the bank from its cassava revenues, but for simplicity's sake the loan is modelled as part of the farm P&L.
- Baseline and Segment 2 farmers incur more costs during the year than they get paid in cassava revenues after harvesting, which results in gradually increasing losses.
- The prevalent farming practice is to plant and harvest a farmers' entire farm in one go (this is currently modelled in June). Therefore, the largest inflow and outflow of cash for cassava farmers happens in that period. However, if instead farmers (are trained to) plan harvesting and planting over a distributed period of 2-4 months, it would allow for a more balanced and distributed cashflow, reducing the chances of financial mismanagement by farmers.

Farmer net income is sensitive to price, yield & repayment period

Net income in 2019 for Segment 1 farmer (farm-gate price and production assuming 2 ha / farmer)

Farm-gate price (NGN/MT) ↓ | Production (kg/ha) →

	14	18	22	26	30	34
6000	-337686	-289686	-241686	-193686	-145686	-97685.9
10000	-225686	-145686	-65685.9	14314.12	94314.12	174314.1
14000	-113686	-1685.88	110314	222314.1	334314.1	446314.1
18000	-1685.88	142314.1	286314.1	430314.1	574314.1	718314.1
22000	110314.1	286314.1	462314.1	638314.1	814314.1	990314.1
26000	222314.1	430314.1	638314.1	846314.1	1054314	1262314
30000	334314.1	574314.1	814314.1	1054314	1294314	1534314
34000	446314.1	718314.1	990314.1	1262314	1534314	1806314

- Under the current block farming scheme, a Segment 1 farmer incurs losses in the first three years, in which first year losses are the highest at NGN 65,686. This is driven by land clearing repayment investments.
- The minimum viable production for a 2 ha block farm (at a farm-gate price of 10,000 NGN/MT) to return a positive net income is 26 MT/ha. This is not likely to be achieved in the initial SDM years.

Net income in 2019 for Segment 1 farmer (farm-gate price and repayment period assuming 2 ha / farmer)

Farm-gate price (NGN/MT) ↓ | Repayment period (y) →

	1	3	5	7	9	11
8,000	-393,486	-153,686	-105,726	-85,172	-73,753	-66,486
10,000	-305,486	-65,686	-17,726	2,828	14,247	21,514
12,000	-217,486	22,314	70,274	90,828	102,247	109,514
14,000	-129,486	110,314	158,274	178,828	190,247	197,514
16,000	-41,486	198,314	246,274	266,828	278,247	285,514
18,000	46,514	286,314	334,274	354,828	366,247	373,514
20,000	134,514	374,314	422,274	442,828	454,247	461,514
22,000	222,514	462,314	510,274	530,828	542,247	549,514
24,000	310,514	550,314	598,274	618,828	630,247	637,514
26,000	398,514	638,314	686,274	706,828	718,247	725,514

Current situation

- To make the block farming model viable, Niji could pay market prices (at ~25% higher than what Niji pays currently) to block farmers during the initial years. However, this would shift the losses from farm P&L to Niji Foods. Revising the price downwards in future could be difficult to justify to farmers.
- Another option would be to extend the land clearing repayment period from 3 to 7 years or more. This would increase the overall invested (tied-up) capital for Niji, but not affect the P&L as much as the above option.

Financial analysis overall SDM

This chapter presents the findings of the financial analysis of the whole SDM.

In this section you will:

- ✓ Understand the financial performance of the SDM
- ✓ Get an insight of the different sources and founders of the SDM
- ✓ Find an overview of the financing KPIs

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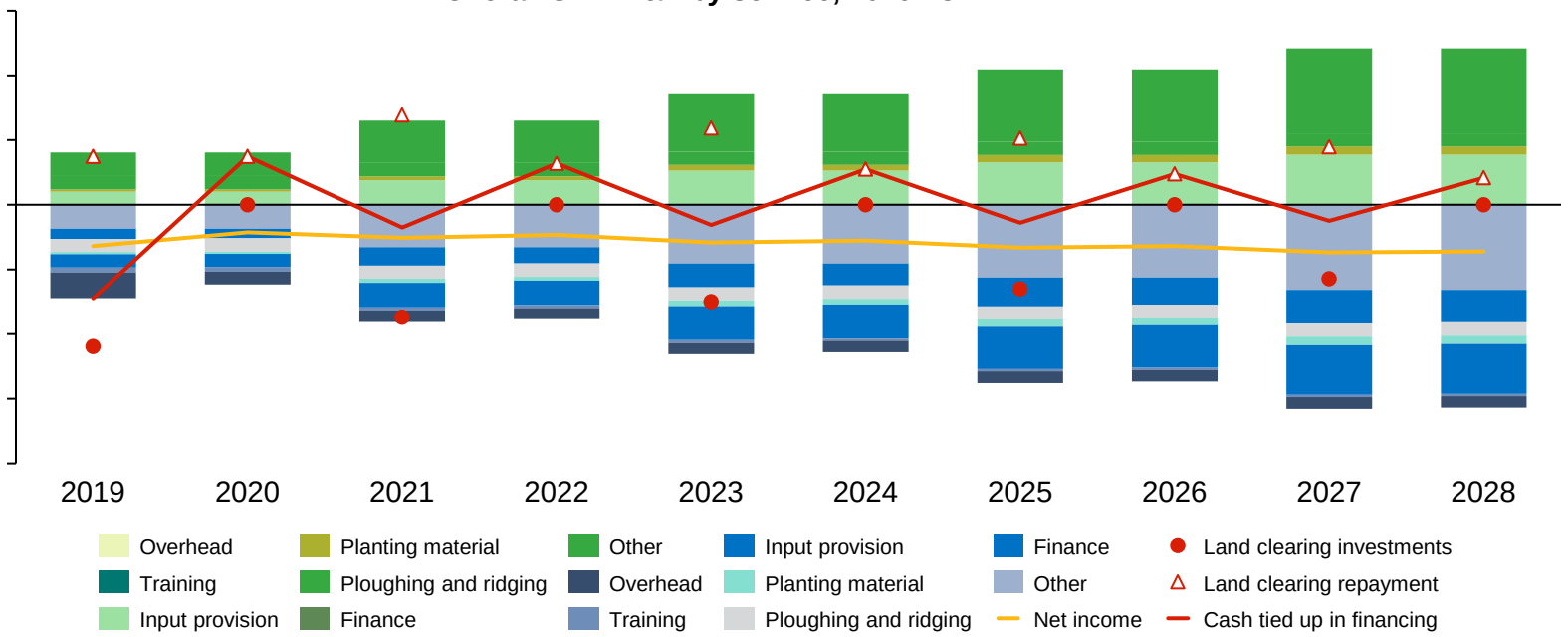
SDM P&L (without commercial sourcing)

Overall SDM P&L by service, 2019-28

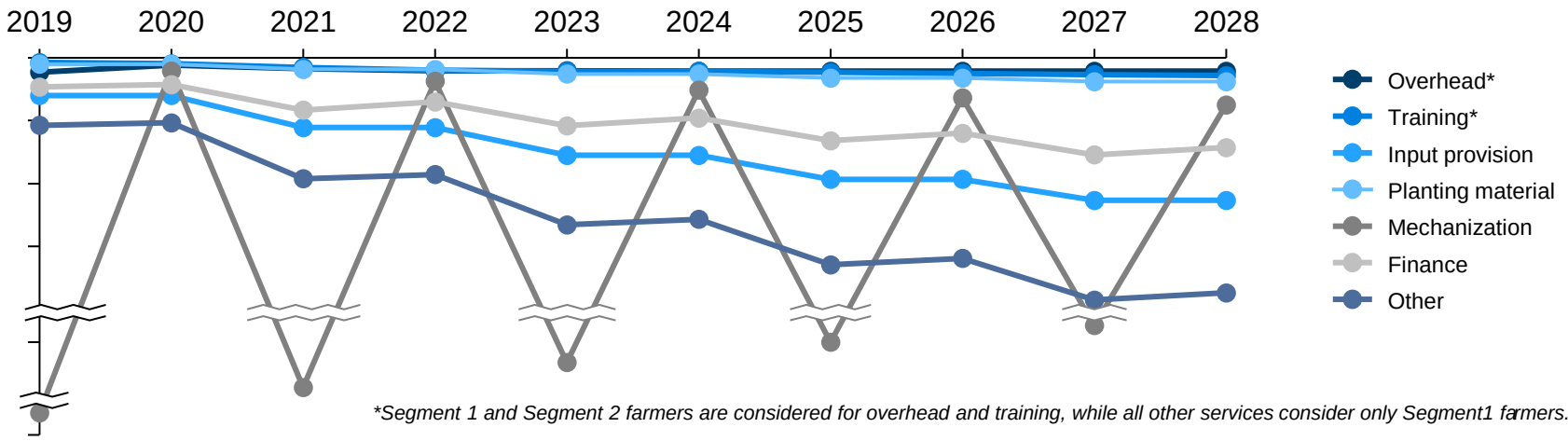


Economic sustainability of the SDM

- The SDM P&L is negative throughout the 10 years and shows a slow decline. This is because some service costs are not recovered with any revenues—namely, overhead, training and utilities costs. The biggest cost driver for the SDM P&L is utilities costs. These undergo a sustained increase over time as farmers increase their land size. Overall, the SDM is predicted to make losses.
- The model assumes a constant default rate of 20% for block farmers (of these defaults, 25% is to be covered by Niji Foods) as land and operating costs per farmer increase. However, in reality, default rate should go down from 20% as the net income of block farmers increases and farmers increase their resilience. The SDM would likely make fewer losses than what this model predicts.
- Interestingly, there is a see-saw pattern in the cash tied-up in financing with an upward trend. The short term up and downward trend (see-saw) is explained by the land clearing repayment period of 3 years, together with bi-annual land clearing investments. The longer-term upward trend of the total see-saw is explained by the reduction in additional land clearing required every other year. As farmers become more productive, Niji Foods' starch facilities will need less land to cover the same number of factories.

SDM service cost per farmer

SDM cost of services per farmer, 2019-28

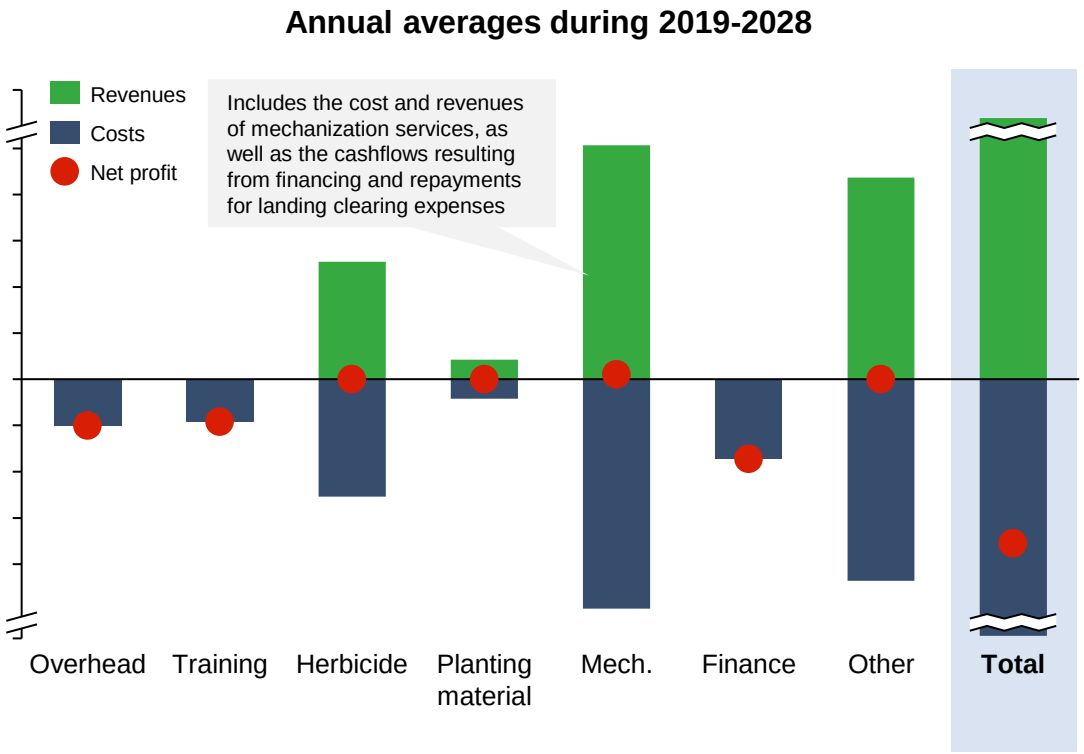


**Segment 1 and Segment 2 farmers are considered for overhead and training, while all other services consider only Segment1 farmers.*

Cost of services over time

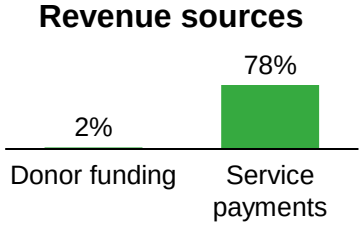
- The costs per farmer of inputs and planting material provision gradually increase as land size per farmer increases.
- Overhead costs per farmer steadily decrease between 2019 and 2028. This is because farmer registration costs and staff needs slightly decrease over time. Furthermore, SDM development costs are only incurred at the beginning of the SDM.
- Training costs per farmer gradually decrease because block farmers are trained only for the first five years of SDM, and during those 5 years, their training gradually becomes less intensive.
- Finance and other costs per farmer increase over the duration of the SDM. The main driver of finance costs is the loss due to farmer defaults. The total volume of defaults is predicted to increase over the years because of the increase in the size of individual block farmers' total annual loans, which increase with acreage and yields. The current predictions assume a constant default rate of 20%. In reality, with the increase in net income of block farmers, default rates would likely go down, and thus finance costs may not increase as steeply as is predicted here.
- Land rent and utilities costs per block farmer increase over the duration of the SDM as average cultivated area per farmer increases.
- Mechanization costs per farmer follow a see-saw pattern because land clearing only needs to happens in alternate years when area per block is scaled-up. Over time, the magnitude goes down because of reduced requirement of additional land clearing per farmer.

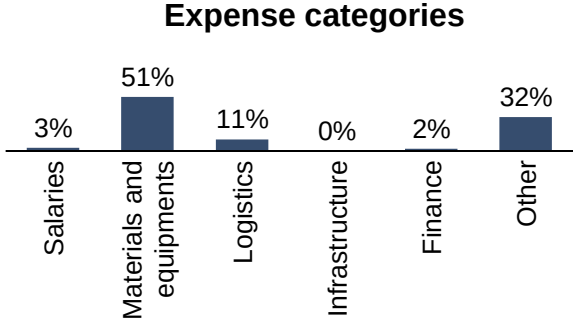
Overview of service profitability



Service profitability

- Overall service provision in the current scenario is not profitable.
- Input provision, planting material provision and other services are repaid by block farmers at the cost of service provision.
- Overhead, finance and training incur losses, because there are no revenues for Niji Foods for providing these services to block farmers. The main cost driver for finance is the default rate. The main costs drivers for training are the number of extension officers.
- Mechanization is the only service that is profitable because land clearing is repaid with a 10% interest rate to Niji Foods which is added to the cost of provision.



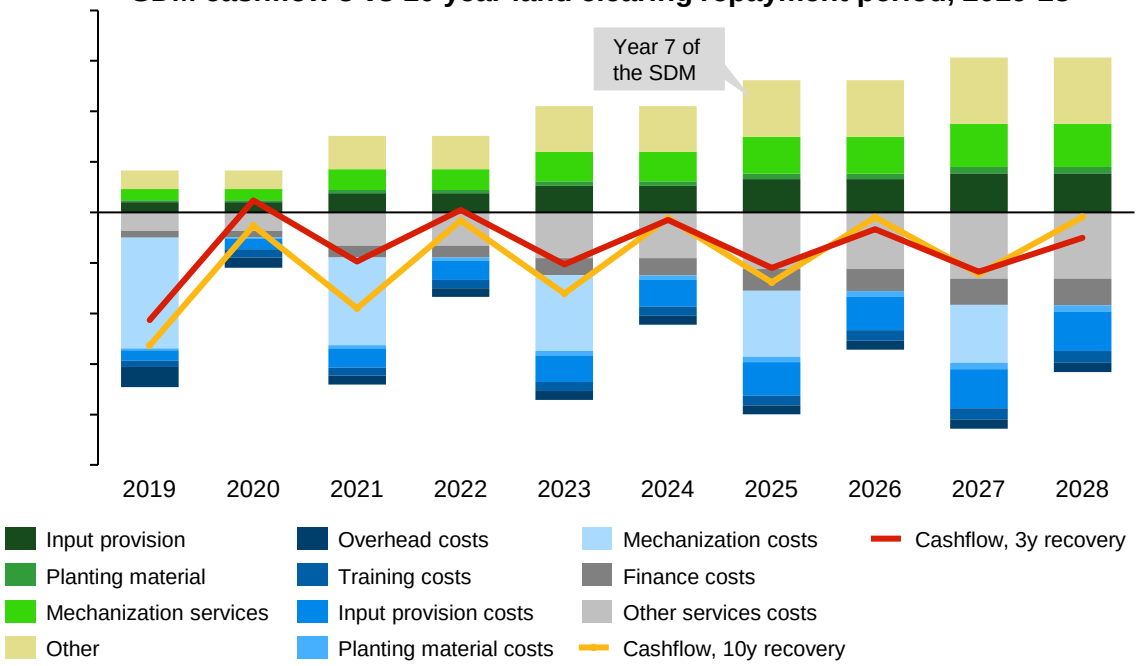


Revenue sources and expense categories

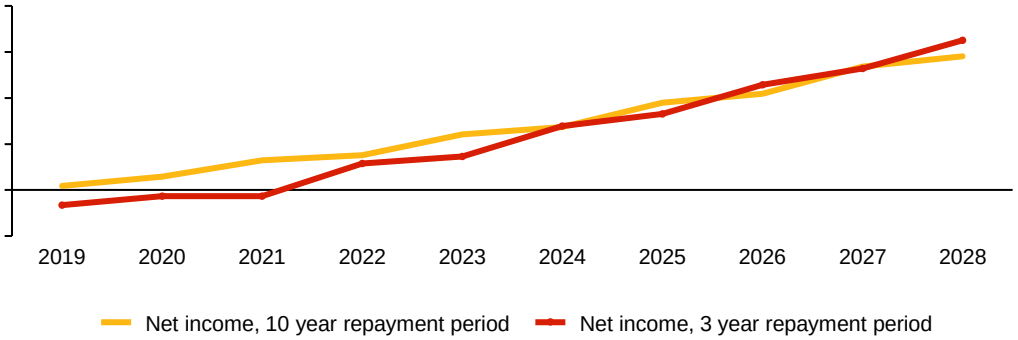
- Service revenues come mostly from payments from block farmers, with only 2% contributed by IDH (the first 3 years for training).
- Materials and equipment expenses, including mechanization services, account for half of service expenses.

Land clearing impact on SDM and farmer cashflow

SDM cashflow 3 vs 10 year land clearing repayment period, 2019-28*



Segment 1 (block) farmer net income: 3 vs 10 year land clearing repayment period, 2019-28



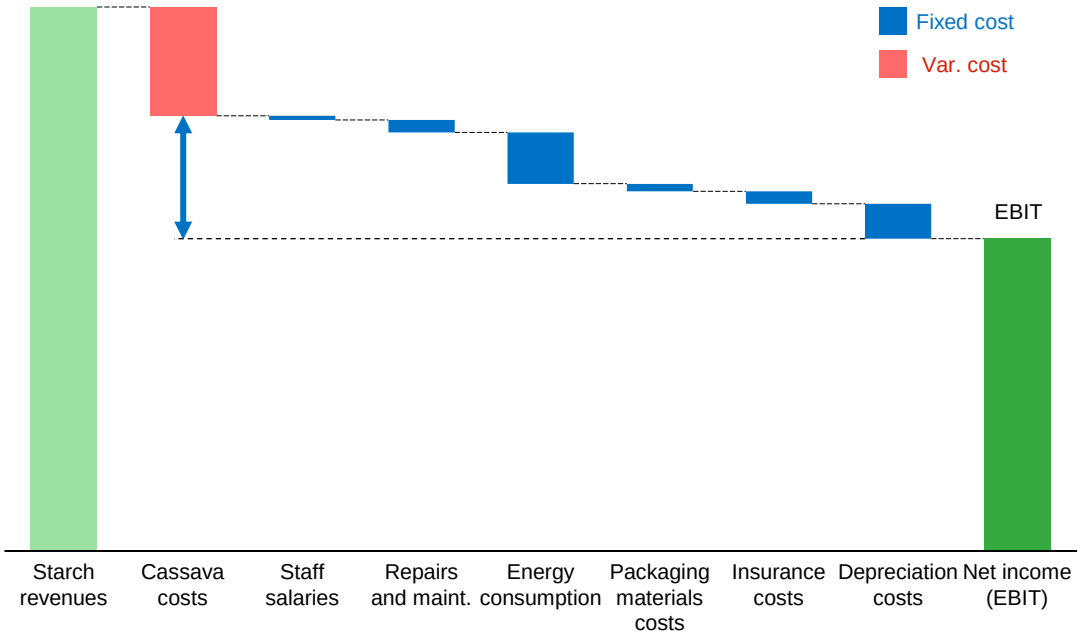
Economic sustainability of the SDM

- If the land clearing repayment period for SDM farmers increases from 3 to 10 years, cash inflows to Niji Foods decrease for the first 7 years of the SDM (see top graph). This puts cashflows under more pressure. By 2028, a 10 year repayment period results in significant additional NGN tied up in land clearing investments compared to a 3 year period.
- However, the repayment period extension renders the block farming model viable (see bottom graph). While a 3 year repayment schedule only allows block farmers to reach positive cashflows by 2022, a 10 year repayment period enables farmers to generate a positive cashflow from year 1 of the out-grower scheme.
- If Niji Foods keeps a 3 year repayment cycle, securing increased financing from banks (a 3-4 year loan) will enable block farmers to cover negative cashflows in initial SDM years and lower default risks.

**Cashflows have not been discounted to present value.*

Starch processing facility P&L (per facility)

P&L of a starch processing facility, 10-year average (2019-28)



Economic sustainability of the starch processing facility

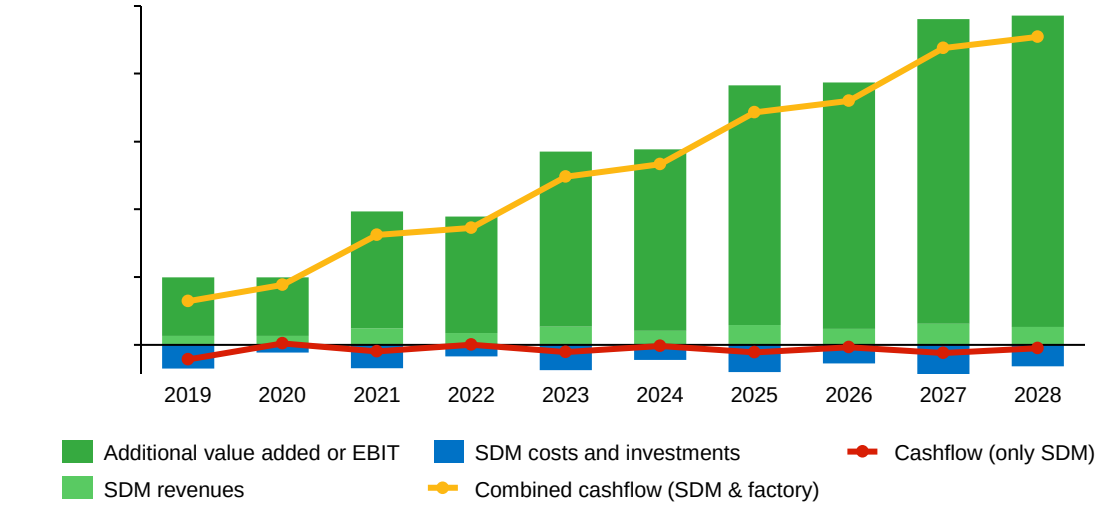
- The starch processing facility is the main SDM revenue generator. Expected starch revenues per factory are significant.
- The key cost driver is sourcing cassava. The benefits of the SDM is shown by the added value of sourcing from SDM over baseline farmers *(see slide 36 for a detailed breakdown).*

Economic resilience of starch production facility

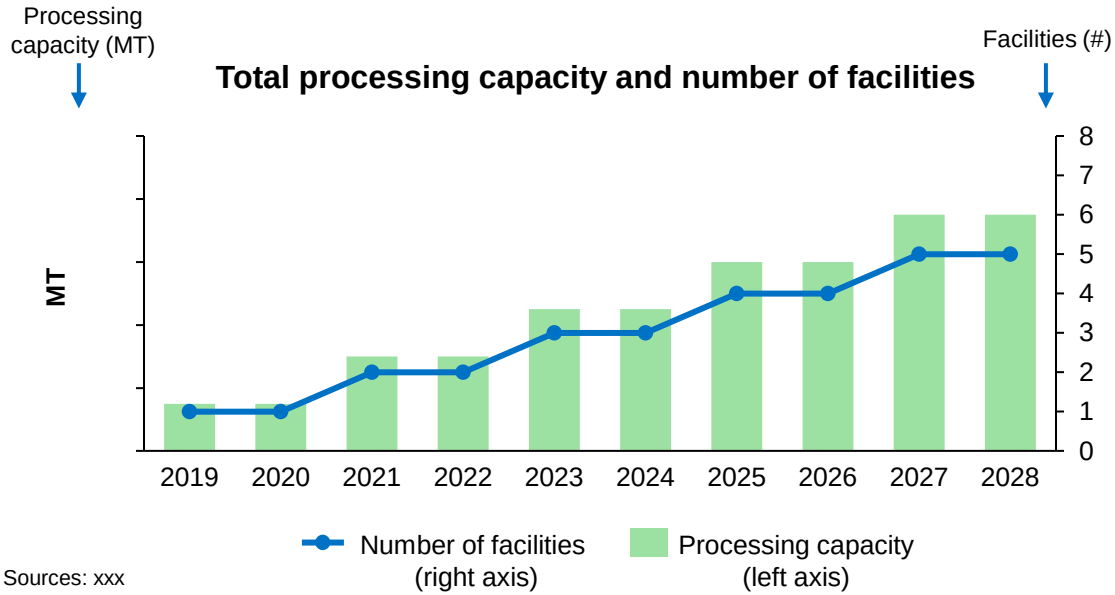
- The starch production facility highly profitable and resilient to both cassava and starch price fluctuations.
- Both cassava and starch prices are highly volatile. However, the factory can withstand large starch prices while remaining profitable.
- Another consideration is capacity levels. The figures used in this analysis assume the factory is running at full capacity (300 days/year). If capacity levels were to drop, at current starch prices, the starch line can still remain profitable with up a significant fall in capacity.

Combined cashflow: SDM and starch processing facility

Combined cashflow SDM and processing line



Total processing capacity and number of facilities



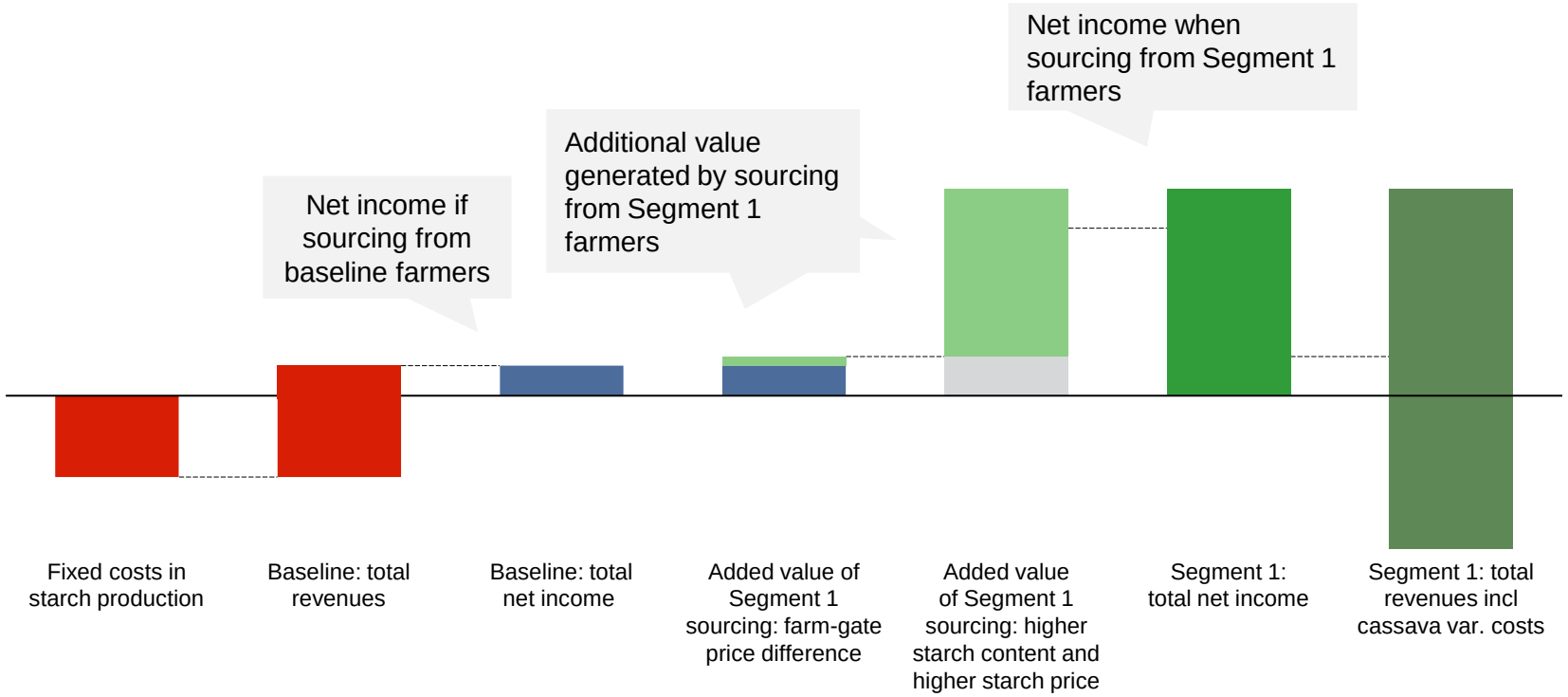
Sources: xxx

SDM sustainability including sourcing operations

- When including the additional value generated by sourcing from Segment 1 farmers (block farmers), the SDM is expected to be sustainable with a positive cashflow from the first year.
- The addition of new starch processing lines (50 MT/day capacity per facility) every 2 years drives the scale-up in sourcing quantities and thus increases the additional value generated from starch processing. This is expected to result in a significant increase in combined cashflow (SDM & factory) from 2019 to 2028. The net cashflow of (only) SDM is expected to gradually become more and more insignificant as compared to the additional value generated in starch factories.
- There is a limit to which Niji can keep on scaling the factory capacity and sourcing volumes without increasing the number of farmers. This is important to consider for expansions after 2028.

Added value from SDM on starch processing facility

Value from starch processing facility when sourcing from Segment 1 vs baseline farmer, 10-year average (2019-28)



SDM's added value from the starch processing facility

The additional profit (net income) or value addition is coming from two key sources:

1. The added value of the SDM enables Niji Foods to buy cassava at below market price from block farmers;
2. Niji expects to be able to source cassava from block farmers that has 2 percentage points higher starch content and get higher prices from starch buyers through bulk contracts given secured supply.

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This chapter presents the findings and conclusions of the overall analysis, reflecting on the objectives described at the beginning of the analysis.

In this section you will:

- ✓ Get insights of the overall SDM performance in relation to the initial objectives
- ✓ Find the key drivers for success identified and the lessons learned

Conclusions: key drivers for success and key risks

Key drivers of success

Capacity utilization:
- The modularity (or easy replicability) of the starch plant makes this SDM unique. It will allow the SDM flexibility in its scaling trajectory. If the starch production facility works as modelled (full capacity), the SDM will be able to finance the land increase over time per block farmer. Land increases are necessary for the SDM to be able to construct new facilities and fill expected sourcing needs. If the facility does not work as planned, the additional land clearing can be delayed without hurting profitability of the facility.

Quality and quantity of sourced cassava:
- The block farm set-up enables Niji Foods to control block farmers' activities on a daily basis. This way it can control the process and with that make sure it has a stable supply of raw materials for the starch facility.

Financial position of the farmer:
- Land clearing is a very large investment in the set-up of this SDM. The decision on the repayment period heavily affects the farmer P&L. An increase from 3 to 7 years would remove a negative farmer P&L in the first 3 years of the SDM.

Synergies across Niji Group:
- Niji Group provides many benefits for Niji Foods' block farmers. Farmers can adopt best practices from NISA (Niji Groups' agricultural institute), and have a stable low cost input for quality stems (Niji Farms) and mechanization services (Niji Tractors).

Key risks

Anchor Borrowers' Program:
- The Bank might not be willing to provide a loan for mechanization services as costs of land clearing increase over the years.
- This would require Niji to finance the loans themselves and increase their exposure to farmers' default risk to 100% instead of the current 25% of the loan.

Default rate:
- The model assumes a constant farmer default rate of 20% (of which Niji Foods bears 25% of the costs). Under current assumptions (i.e. repayment period of 3 years and low prices), block farmers will not be able to repay their annual loan for the first three years. This might increase the rate of defaulting farmers.

Starch price:
- Currently, it is assumed that the bargaining power of Niji Foods increases with the block farm set-up. This will lead to an increase of 25% of starch prices they can charge to their customers. This is responsible for the largest part of the additional value created by the block farm set-up (via the starch line).

Modelling assumptions:
- Current historically low cassava prices are used in the model to predict future outcomes in both farmer and SDM level analyses. This might overstate the starch plant's profitability in the long run if raw material prices fluctuate over time.

Lessons learned during the study exercise

Opportunities for improvement

Improving farmer P&L:

- Under current cassava farm-gate prices, increasing the repayment period for land clearing loans from 3 to at least 7 years improves the sustainability of the SDM as it will have a significant positive influence on farmer defaults rates
- Another option is to provide block farmers access to services and access to market if they own land outside the block farm. This would help to ensure their income is large enough to repay their loans, while giving Niji Foods the option of additional quality cassava for their sourcing needs.

Improving default risk:

- Niji Foods would benefit from a separate financing plan for its land clearing investments. It is potentially interesting to explore the opportunity of international donors hedging local bank risk for this project. This could incentivize banks to provide a 3 year loan with an interest rate close to that of the Anchor Borrowers' Program.

- Integrating farmer groups could mitigate the risk of defaulted loans. A model of offering loans to groups instead of individual farmers would lead to social obligations between farmers to (partially) cover each other's default losses.

Key factors in replication of the model

Access to market:

- The main benefit for farmers participating in the SDM is secured offtake and Niji Foods offering easily available transportation. As prices are historically low, farmers in the open market cannot easily find a buyer for their cassava, and rely heavily on efficient transportation due to the perishability of cassava. The overall benefit for block farmers therefore lies in giving farmers these assurances, which results in long-term smoother and more secure incomes.

Commercial interdependence:

- Niji Foods' engagement with farmers is driven by commercial necessity which ensures a long-term commitment towards Segment 1 farmers. This provides a strong incentive for Niji Foods to balance commercial needs with farmer impact in the SDM.

Access to finance:

- The financing scheme of the Anchor Borrowers' Program is key for this SDM. It decreases the capital needed from Niji Foods to invest upfront in offering SDM services on credit while covering the full risk of farmers defaulting on their loans.

Increasing land size per farmer:

- To ensure a sustainable growth trajectory of Niji Foods and the SDM, it's essential to focus on growing the land size per farmer instead of growing the number of farmers. This growth strategy comes with lower farmer default rates and with more impact on out-growers' livelihoods.

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Annex

Overview of SDM stakeholders & objectives

Services, scale and organization of the SDM

Farm-level impact

Service entities

Financial analysis overall SDM

Conclusions

Annex

This chapter presents additional information that were used to carry out the analysis.

In this section you will:

- ✓ Get a general introduction to Service Delivery Models
- ✓ Get insights on other analysis (e.g. environmental lens, gender lens)

Annex I: SDM General Introduction & context

This section of the annex is standard for all cases and provides an introduction to the topic and the approach of this study.

In this section you will:

- ✓ Understand what SDM means
- ✓ Get a snapshot of the stakeholders and forces that shape an SDM
- ✓ Get an overview of our approach

Service Delivery Models (SDMs)

SDMs are supply chain structures, which provide services such as training, access to inputs and finance to **farmers**, to improve their performance, and ultimately their profitability and livelihoods.

Service providers offer the services; they can be a trader, processor, farmer organization, NGO, public extension scheme, etc.

Investors tend to be (final) buyers of the product, looking to secure their supply and / or for reputational reasons are interested to invest in the farmer.

Processors, traders and other value chain players in agri-commodities are beginning to see service delivery as part of their business, rather than something the buyer requested or only as a way to create farmer loyalty.

This results in value chain players establishing a relationship with the farmer as a client, being interested to gain a better understanding of the structure of their existing SDMs, what services are being delivered, to which farmers, and the impact on their business.

Companies are also gaining a clearer understanding of how to fund such services and are exploring ways to make their model less dependent on external funding, i.e commercially viable.

Service delivery models and the stakeholders that shape them are evolving

- Processors, traders and other value chain partners - see service delivery as part of their core business
- Financial institutions, development banks and social investors – show an increased risk-taking appetite
- Donors - focus on how to create the largest leverage and return on investment
- Innovative businesses emerge that develop solutions for optimizing service supply

Levels of SDM Analysis

SDM Structure

The analysis looks at the SDM from a holistic perspective, identifying the way the model is structured

Within this structure (financial) resources are invested

Those resources allow for a set of services to be delivered

These services are targeted at a (type of) farmer

The aim of these services is an impact at farm level

This impact translates into financial benefits so the structure (over time) becomes financially sustainable

This analysis in this case study is organized in the following way:

1. What is the **structure** of the SDM
2. What are the **services** provided
3. What is the impact of those services at **farm** level
4. What is the business case for the individual **entities** delivering the services
5. What is the **financial** impact of the SDM as a whole
6. What **conclusions** can we draw from our analysis

Purpose of the SDM Analysis

An outcome of SDM analyses to date was the identification of those issues which the SDM operators found of critical importance, and where they encountered limited knowledge to be available. Examples are:

Focus learning questions

- How to improve adoption and loyalty rates
- How to use farmer profiles to tailor make service packages
- How to drive down costs (for farmers and service operators)
- How to finance a SDM (types of finance, types of farmers) and timelines
- How to create a positive enabling environment for a service delivery model

IDH will stimulate dialogue with key partners on these topics, by targeting these questions in a broader range of SDMs and by facilitating webinars and knowledge sharing events.

IDH aims to create:

Action driven analysis

- Analyzing a broader range of SDMs with partners that are keen to improve their SDM
- Establishment of an Innovation Program & Fund to co-design and co-fund innovative solutions within SDMs
- Develop insights packaged for financial institutions, which facilitate partnerships with service providers

A learning community

- Deeper analyses on key levers for optimizing performance of SDMs; e.g. farmer segmentation and adoption
- Convening key partners on pre-competitive topics in SDMs through learning events, webinars and knowledge sharing
- Forming strategic partnerships with knowledge partners that share the interest in driving performance of SDMs

With the SDM analysis, IDH envisions to identify and create actionable improvement opportunities

Individual SDM analysis:

Analyze SDM

Identify key success drivers

Identify enabling environment challenges

Identify opportunities for innovation

Evaluate funding needs

To facilitate further learning and improvement, IDH aims to establish:

Global knowledge hub

- Deeper analyses on key levers for optimizing performance of SDMs; farmer segmentation and adoption
- Benchmarking data and best practice for designing and implementing smallholder business models
- Organize learning community

Enabling environment

- Convening key partners (at sector and national level) on pre-competitive topics in SDMs
- Forming strategic partnerships with knowledge partners that share the interest in driving performance of SDMs

Blended finance

- Establishment of an Innovation Program & Fund to co-design and co-fund innovative solutions within SDMs
- Develop insights packaged for financial institutions, which facilitate partnerships with service providers

Technical assistance

- Innovating and improving smallholder business models of private sector players
- Using private sector lessons to inspire public sector players and vice versa

Annex II: Context

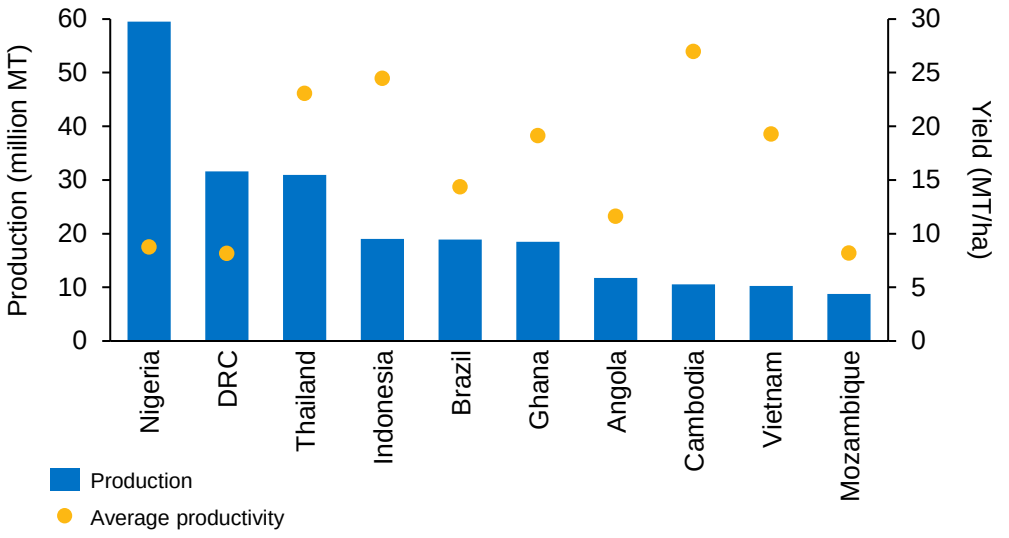
This section of the annex is standard provides a description of the context of the SDM

In this section you will:

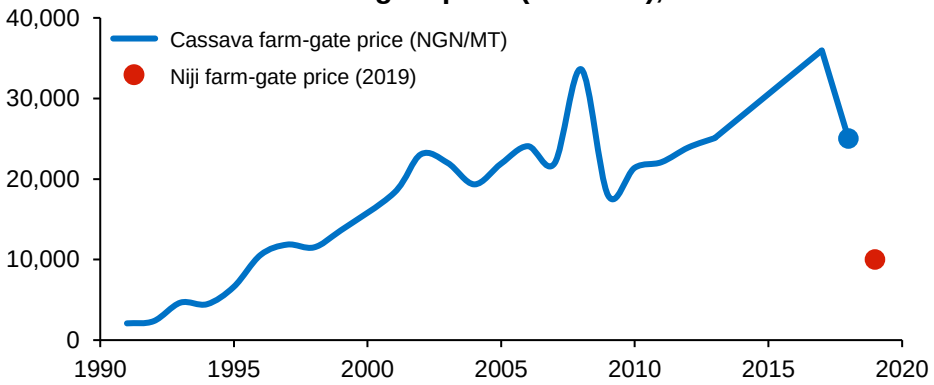
- ✓ Get a comprehensive overview of the SDM structure
- ✓ Get insights on the development of the commodity sector and characteristics of the farmers in the region under study
- ✓ Get insights on the role of farmer organizations
- ✓ Understand the enabling environment in the region
- ✓ Get insights on the status of gender equity
- ✓ Get insights on the status of environmental resilience of farmers

Context – developments in the cassava sector

Production and yield of top 10 cassava producing countries (2017)[1)]



Cassava farm-gate price (NGN/MT), 1991-2018[1)]



1) FAO (2018): FAOSTAT database

Nigeria is the world's largest producer of cassava roots. Despite increasing yields in the past years, average productivity (MT/ha) is low relative to the other major cassava producing countries. Farms are small and face many challenges, including access to affordable finance, quality inputs, mechanization and infrastructure. This limits the ability of farms to professionalize and improve yields.

Historically, cassava has been produced on a subsistence basis, but commercial production has grown strongly over the past years. The country has the capacity to supply enormous volumes of fresh cassava, and it has a long-standing high-quality cassava flour (HQCF) production industry. Recent industrial developments are mainly within starch processing, blending of HQCF in wheat flour-based products and in ethanol production. These products have the potential to substitute large volumes of goods imported into Nigeria.

Successive governments in Nigeria have identified the cassava value chain as a priority area for development. As a result, large investments have been made in industrial processing.

Potentially as a result of the investments made in the sector, there has been considerable over-supply in the past years. As a result, prices have dropped significantly, with the current price being at approximately 10,000 NGN/MT. At this price level and the low yields in Nigeria, producers may be driven out of the sector.

Context – Cassava farmers in Nigeria

The Farm

- The majority of cassava farms (~77%) are small (0.5-2 ha). 22% of farms have larger (2.5-5 ha) and more productive (18 MT/ha) farms. Large-scale production (>50 ha), for which productivity typically reaches 20-30 MT/ha, only accounts for 1% of Nigerian farms.[1]
- Smallholder farmers lack financial resources to invest in mechanization, quality planting material and inputs. They are usually not trained in GAP and financial institutions rarely extend loans, or do so under very constraining terms.
- The average national yield of cassava is estimated at about 13.63 MT/ha in 2019, against a potential yield of up to 40 MT/ha.[2]

Household

- Cassava farms are run by families, in which both men and women work.
- Cassava is a basic rural and urban food staple; a significant part of the harvest is sold in processed form.
- The Nigerian average median household income is 2,667 USD and median per-capita income is 493 USD.[3]

Income

- Cassava is traditionally a subsistence crop for which excess production is sold.
- Cassava farmers earn additional petty income through intercropping. Other crops grown include maize and legumes such as cowpeas.
- A traditional cassava farmer of 1 ha with an average yield of 10 MT/ha has an average net income of 60,700 NGN (170 USD). In contrast, a farmer using mechanized land preparation, improved cuttings, and farm inputs can reach 20 MT/ha and a net income of 131,700 NGN (366 USD)[4]

1) CAVA II project (CAVA, Cassava: Adding Value for Africa) (2017). 2) FAO, Nigeria at a glance (2019). 3) Gallup (2013). 4) Dalberg (2015).

The enabling environment

Impact of environment on SDM

L (Limiting) = The environment hinders the implementation of the SDM

N (Neutral) = The environment does not influence the implementation of the SDM

E (Enabling) = The environment facilitates the implementation of the SDM

	Definition	Opportunities and challenges	Impact	Measures taken by SDM operator
Governance	**LAND OWNERSHIP** Existence of land ownership rights / regulations and their enforcement. Ease of purchasing/ transferring land	Land ownership is an issue in Nigeria, with most farmland collectively belonging to local communities. Formal leases/sales a rarity.	L	Niji Foods has leased a sizeable tract of land and cleared/prepared 700 ha.
Governance	**INFRASTRUCTURE** Existence and state of roads, water and electricity networks as well as proximity to main trading / processing hubs (e.g. access to market)	Infrastructure is mostly poor, with sub-standard roads to markets. Water and electricity network is almost non-existent or minimal in the SDM area.	L	Niji Foods uses power generators to step in in cases of a power failure.
Farm Inputs	**LABOR** Cultural norms that restrict /promote people of certain ages, genders or social groups from farm labor. Availability and cost of labor	Manual tasks are performed by both men (more physically demanding tasks) and women. Urban drift has made labor scarce and costly (about 83% of variable costs in North Oyo State[1]).	L	Niji Foods have mechanized most tasks performed manually on smallholding farms (land clearing, ploughing and ridging).
Farm Inputs	**INPUTS & FINANCING** Availability of affordable, quality inputs and the necessary marketing and distribution mechanisms. Availability of credit. Enabling regulatory environment	Quality inputs are usually not available or affordable (and/or financing is not available).	L	Quality stems and herbicides are provided on credit to out-growers. Niji takes care of collective bargaining for agrochemicals, which brings down the prices.
Crop	**TRADING SYSTEM** Organization of the system through which crops are traded from farmer to market, including the number and type of actors involved	The majority of raw cassava is sold at farm-gate. There is a high risk of side-selling and farmers not respecting contract terms.	L	Niji Foods offtakes 100% of the block farm harvest and out-growers are accountable to each other in 25-member groups.
Crop	**PRICING & COMPETITIVENESS** Market dynamics of the main crop of the SDM, including competition between buyers and possible price-setting by the government or other parties	The rapidly rising industrial demand together with a volatile exchange rate drive large fluctuations in farm-gate prices leading to uncertainty and long-term planning issues for farmers and processors.	L	Niji Foods sources the harvest at a beforehand agreed farm-gate price. Prices can be renegotiated each year.
Sustainability	**ENVIRONMENTAL RISKS** Climate change, possibility of extreme weather, water supply and quality, pests and diseases. Potential environmental damages such as deforestation	Increased demand for cassava has led to deforestation and intensive mono-cropping. The latter leads to soil nutrient deterioration without appropriate crop rotation and thus long-term decrease in cassava productivity.	-	None
Sustainability	**SOCIAL CONTEXT** Availability and quality of schooling / healthcare. Cultural factors. Potential social externalities like child labor, gender disparity	Clashes between herdsmen and cassava farmers sometimes occur because of the damages caused by encroaching cattle on cassava farms.	L	Niji Foods provides security to its farmers to stop herdsmen's cattle encroaching.

Sources:1) Abila. Labour Arrangements in Cassava Production in Oyo State, Nigeria (2011).

The status of gender equity in Nigeria and the SDM

Enabling environment

In Nigeria, both men and women are heavily involved in staple and cash crop production. Due to patriarchal structures as well as social, cultural and religious constraints which includes patrilineal inheritance norms, women lack land tenure, decision-making power, and access to and control of assets and services. As a result, they have smaller plots of land, use less inputs, and produce and earn less than men for farming staple and cash crops.

Primary education enrollment * [1]	**0.83**
Owner of a bank account or used a mobile money service in the past year * [2]	**0.53**
% of married women who participate in decision-making ** [3]	**52%**

Legend
- Men
- Women
- National average

Gender ratio (Female / Male)[1]

Comparison of Niji Foods to the national context

- The gender ratio for Niji Foods employees is over 7.5 times lower than the Nigerian average. 1 out of Niji Foods' 9 staff members is female.
- Yet, Niji Foods staff consist of senior and middle management plus three extension officers. In Nigeria, these roles have more gender inequality. The share of females in middle and senior management and in extension officer roles respectively is 29% and 28%. On a role-specific basis, Niji Foods is therefore closer to, but still below, the national average.
- However, the female employee at Niji Foods receives the same income as males for equivalent work. Although this is only based on one employee, this indicates efforts to ensure gender income parity at Niji Foods.

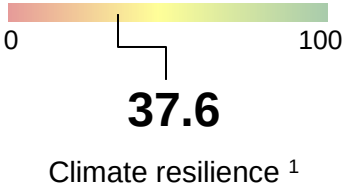
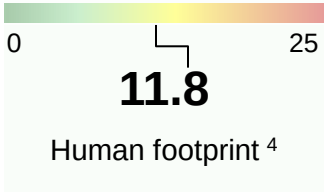
	Nigeria	SDM
How does Niji Foods' ratio of female to male employees compare with the country labor force participation? * [1]	0.84	0.11
How does Niji Foods' proportion of female to male farmers compare with the country-wide farmer distribution? [5]	65% / 35% (2018)	N/A
How do the incomes earned by Niji Foods' employees compare with the incomes earned by women and men in the country? * [1]	0.75	1.00
How does the yield (kg/ha) Niji Foods' male and female farmers compare with the country average? [4]	13,630 Average	26,000 Average

*Divide female indicator by male indicator to get ratio. A ratio of 1 indicates parity between the sexes; a ratio between 0 and 1 typically means a disparity in favor of males; whereas a ratio greater than 1 indicates a disparity in favor of females. **Own health care, major household purchases, and visits to family or relatives

Sources**: 1)** World Economic Forum (2016): Global Gender Gap report; **2)** World Bank (2017): Global Findex; **3)** UNICEF (2013): Demographic and Health Survey; **4)** FAO (2018): Global Crop Database; 5) Mohammed, B. T. and Abdulquadri, A. F. "Comparative Analysis Of Gender Involvement In Agricultural Production In Nigeria "

Sources: Ajani, O. "Gender Dimensions of Agriculture, Poverty, Nutrition and Food Security in Nigeria"; Ogunlela, Y. and Muhktar, A. "Gender Issues in Agriculture and Rural Development in Nigeria: The Role of Women"; Feed the Future (2017). "Nigeria: In-depth Assessment of Extension and Advisory Services"

Environmental resilience of farmers in the SDM

	Indicator	Discussion	SDM Risks & opportunities
Climate resilience	 Climate resilience [1]	Nigeria is assessed to be low in climate resilience. It has both a great need for investment and innovations to improve readiness and a great urgency for action.	• Changing climate & temperatures can affect productivity and increase the chances of pests & diseases • Crop diversification is an opportunity for farmers to increase their overall climate resilience
Soil	**Strong to extreme soil degradation through water erosion**[2]	Oyo state suffers from major loss of topsoil through water erosion. Especially during the rainy season, the displacement of usually fertile topsoil by water can have several negative consequences.	• Sustainable soil management practices (e.g. use of cover crops, increased use of organic fertilizers) can help increase the quality of the structure of the soil and reduce erosion
Water	**Medium to high risk**[3]	Oyo state has a medium to high overall water risk. While baseline water stress is low, seasonal variability and flood occurrence are high and there is a high percentage of the population without access to improved drinking water supplies.	• Long-term risk of water shortages in Oyo state • Increased severity of weather events (e.g. droughts, heavy rainfall) can increase chances of crop failure
Agro-ecosystem	 Human footprint [4]	The environmental footprint of Nigerian human activities on nature and biodiversity is low to medium. Since 1993, the impact of human activities on natural land has increased by 31.25% on a national level. In Oyo state, this impact has remained relatively stable over this period.	• Intensive agricultural practices and urban sprawl are a threat to natural land and local biodiversity • By adopting agroforestry practices, coffee farms contribute to local agricultural biodiversity

1: ND-GAIN Country Index; summarizes a country's vulnerability and readiness to adapt to the negative impact of climate change
2: GLASOD; shows the severity of soil degradation in 4 categories: water, wind, physical and chemical deterioration
3: Aqueduct Water Risk; identifies areas with water-related risks, based on 12 subcategories such as drought severity, seasonal variability and ground water stress
4: WCS Human Footprint; measures the cumulative impact of direct pressures on nature from human activities. Scores 0-50, but national averages rarely exceed 25

Annex III: KPIs and data

This section of the annex provides a description of KPIs used and data sources

In this section you will:

- ✓ Get an overview of the service-specific KPIs used in the analysis for both farmer and SDM operator
- ✓ Get an overview of data sources used to carry out the analysis
- ✓ Get an overview of key assumptions for farmer analytics
- ✓ Get insights on how data is managed (optional)

Data sources

	Data categories	Data collection method	Primary data source(s)	Historic (frequency)	Forward-looking	Key issues	Sensitivity analysis
	Farm size	2019 values based on measured baseline data. Future estimates based on SDM staff assumptions.	Niji Foods baseline data; SDM operator staff assumptions	Baseline year (2018)	2019-28	• Assumptions are based on discussions with limited group from SDM operator	
Agronomic assumptions	Productivity	2019 values based on measured baseline data. Future estimates based on SDM staff assumptions.					◀
	Price	Niji price based on prices fixed for the SDM. Market rate fixed at current prices.					◀
	Labor costs	2019 values based on measured baseline data. Future estimates based on SDM staff assumptions.					
	Input costs						
	Other costs						
SDM assumptions	Scale	2019 values based on measured baseline data. Future estimates based on SDM staff assumptions.					
	Overhead costs						
	Service specific costs						◀
	Service specific revenues						◀
	Adoption & loyalty rates						
	Commercial margins						◀

Annex IV: Glossary

This section of the annex includes an overview of the standard glossary terms used in the SDM analysis

Standard glossary (1/2)

Acronym	Meaning
Assets (farmer segmentation)	Minimum requirements for assets include possessions that a farmer needs prior to joining an SDM, e.g. land, financial resources.
Attitude (farmer segmentation)	Minimum requirement for attitude describes the way a farmer should feel towards joining the SDM, e.g. eager to learn, adopt new practices
Baseline	Group of farmers used as primary reference in analysis for comparison with segments of farmers in the model
Behavior (farmer segmentation)	Minimum requirements for behavior describes how the farmer acts, often attested for by government officials or elderly, e.g. trustworthiness
SDM operator/ partner	The person(s) responsible for the facilitation of the SDM case study on behalf of the investor and / or service provider
Case report	A report on one of the SDM case studies
Case study	An in-depth analysis of an SDM
Donor	Organization that provides (co-) funding but is not part of the SDM
Drivers	Variables (revenue, cost, success) impacting the viability of the model
Economic sustainability	The viability of the SDM in economic terms: the extent to which it benefits farmer, investor and service provider
Enabling Environment	Combination of institutions, infrastructure an regulatory environment that surrounds the SDM
Entities	Those organizations/businesses that are set up to provide services to farmers
Farmers Organization (FO)	Form in which farmers are organized (e.g. cooperatives, farmers aggregation, farmers organizations or other terms)
GAP	Good Agricultural Practices - codes, standards and regulations developed to codify agricultural practices at farm level
IDH	Sustainable Trade Initiative
Investor	Organization that invests (financial) resources into the SDM
Key Economic Indicators	The most important outcome variables to the SDM (e.g. change in farmer loyalty, change in farmer productivity)
KPI	Key Performance Indicators

Standard glossary (2/2)

Acronym	Meaning
Learning Questions	Those questions that drive the analysis of the SDM; the key things IDH or the case partner wants to know out of this specific case
Loyalty	The percentage of total farm production volume sold by the farmer to the buyer in the SDM
NGO	Non-governmental organization
P&L Analysis	A profit and loss statement summarizing the main revenues, costs and expenses incurred during a specific period of time during SDM operations
Remote data collection	The iterative process of collecting readily available SDM data from the SDM Operators, both before and after the field trip
ROI	Return on Investment
SDM Database	Collection of aggregated data from all case studies, with the aim to identify broader lessons long-term trends
SDM Snapshot	Overview of SDM objectives, Theory of Change, entities and services
Segment (Farmer-)	A group of farmers that is a sub-set of the total population within an SDM, sharing certain characteristics
Sensitivity Analysis	Analysis to determine how different values of an independent variable impact a particular dependent variable under a given set of assumptions
Service Delivery Model (SDM)	Supply chain structure which provides services such as training, access to inputs and information to farmers in order to increase their performance and sustainability
Service Provider (SP)	Organization that delivers one or more services (e.g. training, inputs, access to finance) to the farmer
Services	List of services to be delivered to farmers in order to attain SDM objectives (e.g. Certification, crop diversification, training)
Theory of Change	Overview of the process of change of the SDM towards achieving the desired outcomes
Tool	An Excel-based tool used to model an SDM's economic sustainability (P&Ls) for the famer, service provider, and investor.