the sustainable trade initiative

ABAAS SDM Case Report

October 2020

Cassava | Nigeria

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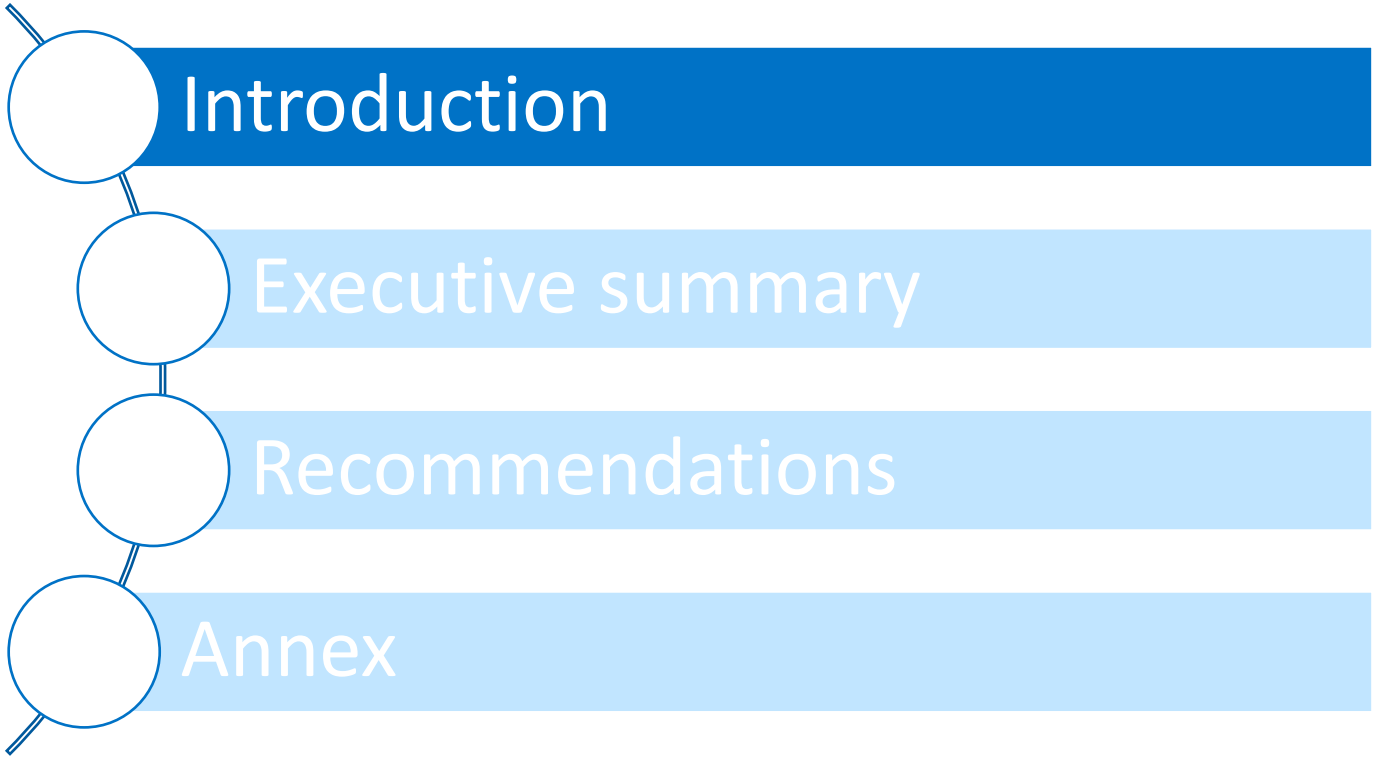

Introducing Service Delivery Models (SDM)

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 ABAAS for their openness and willingness to partner through this study. By providing insight into their model and critical feedback on our approach, ABAAS is helping to pave the way for service delivery that is beneficial and sustainable for farmers and providers.

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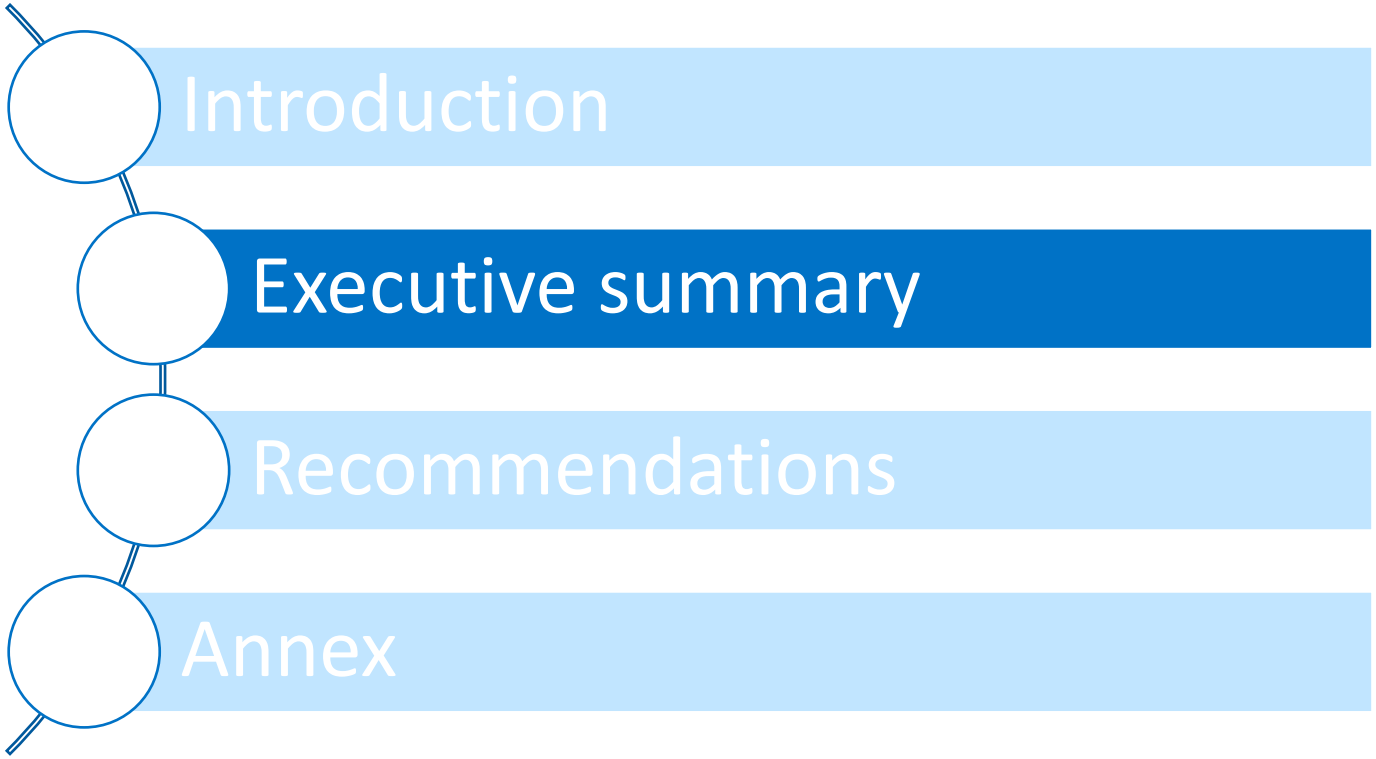


ABAAS seeks to supply their new cassava processing plant by sourcing from smallholder block farmers

- **ABAAS (Arog Bio Allied Agro Services Limited), founded in 2009 in Ekiti state, is an integrated cassava starch and derivatives manufacturing company.** ABAAS will process raw cassava tubers into HQCF and sell it to large buyers in the Nigerian market.
- **ABAAS is currently finalizing the construction of a cassava processing line**, with a maximum capacity of 6,000MT High Quality Cassava Flour (HQCF) per annum. The first year they expect to run at 40-50% operating capacity, increasing to between 80-90% in the second year. Later another line of 4,000 MT per annum will be added to keep up with growing supply.
- **The current strategy is to source the tubers both from block farmers, who farm on land leased from ABAAS, and community farmers who have their own land.** ABAAS owns around 5,000 and leases about 2,000 hectares of land from the government, all available for cultivation by block farmers.
- **Establishing an efficient sourcing model is a pre-requisite** before going ahead with investments in a processing plant as experience shows that many of the plants in Nigeria are operating below their maximum capacity due to lack of raw materials supply.
- **However, as ABAAS has not yet fully implemented the SDM** nor started sourcing, there is a lack of knowledge around the effectiveness of the sourcing model and loyalty of farmers. Limited availability of affordable capital forces ABAAS to strategically prioritize its capital investments and only gradually grow the number of farmers and sourcing volumes.
- **For ABAAS to run an efficient, inclusive and sustainable cassava processing business** it should strategically design its sourcing and service delivery model, while optimizing its working capital needs and attracting new sources of affordable finance.

Sources: 1) ABAAS business plan (2018), 2) ABAAS discussions

ABAAS can implement an efficient, inclusive and climate-resilient SHF block farm model. Optimizing and attracting finance is key.

Economic | Social | Environmental

	Helpful	Harmful
ABAAS	**Strengths** • Sourcing and service model design to optimizing processing plant utilization • Leasing of 2,000 hectares of land to develop block farm • Block farm model ensures high degree of control over quality and security of supply • Processing facility is located near the scattered block farm, minimizing post-harvest losses • Relatively close relationship with community farmers (MoU) • Organic growth strategy leveraging other business units revenues that minimizes external finance dependency	**Weaknesses** • No track-record on providing services to farmers • No formal relationship with FI (for working capital) • Processing factory needs to be built in time for first harvest cycle • Block farm model requires large upfront capital investments and working capital • ABAAS has no/limited access to affordable financing (due to lack of proven commercial viability and impact) • Currently does not own a plot for high-quality stem multiplication • The block farm is scattered in an area with a 50km radius around the processing factory
Context	**Opportunities** • Large domestic market demand for industrial use of cassava derivatives • Potential to increase cassava tuber yields through comprehensive service package • Potential financing through Anchor Borrowers Program with the Bank of Nigeria • Block farming model could empower women, already heavily involved in cassava production, by providing them equal opportunities to own land • Irrigation services coupled with crop insurance could safeguard long-term productivity and farmer incomes • Crop rotation cassava with beans could effectively enhance soil fertility, reduce fertilizer costs and diversify farmer incomes	**Threats** • Highly-fragmented value chain with unstable supply • Rising and volatile tuber farm-gate prices and low, fixed factory-gate prices • Cassava SHFs lack inputs and markets • Poor infrastructure and perishable nature of crop hinders industrial processing of tubers • Strong competition for high quality cassava tubers supply in the same region • Dependency on single buyer • Increased prevalence of extreme climate events such as droughts

ABAAS should strategically design its sourcing and service delivery model, while growing gradually and attracting affordable finance

Reading guide

Strategically designing a block farming model allows ABAAS to control the supply of high-quality tubers to efficiently run their processing facility

- A signed contract between ABAAS and block farmers ensures 100% loyalty and avoids side selling from block farmers
- A clear tuber collection and transport mechanism that delivers the tubers to the processing factory, will reduce the cost and risks of transport
- ABAAS controls the type of locally produced stems used on the block farms to ensure the level of starch and quantity of supply
- ABAAS setting up a phased cropping scheme within the block farm to maximize processing plant utilization

Developing a cost-effective inclusive and resilient Service Delivery Model designed for both block and community farmers

- Provision of services on credit to cash constrained farmers is critical in allowing them to invest in their farms
- Training, improved stems, inputs and mechanization significantly increase yields and quality of cassava
- In order to draw in farmers to work the lands of the block farm, the service package needs to be financially attractive to them
- Irrigation can be a worthwhile investment to mitigate against negative short and long-term climate impacts

Optimizing working capital needs will allow ABAAS to grow their business and SDM organically and sustainably

- An optimal mix of block and community farmers allows ABAAS to run a cost-effective and sustainable business
- Phased cropping schemes and controlled increase in sourcing volumes can reduce the working capital needs
- By growing gradually ABAAS can minimize the need for and cost of external financing

Securing new sources of capital to optimize the combination of debt and equity finance will allow ABAAS to sustainably grow its business

- A proven commercially viable business model with social impact can unlock commercial and impact finance
- Unlocking finance from the Anchor Borrowers Program will enable ABAAS to scale up faster

Legend

A signed contract between ABAAS and block farmers ensures loyalty and prevents side selling by block farmers

Pre-conditions for contracting

There is a need for exchange

- ABAAS supplies high-quality services
- ABAAS supplies prepared land
- Farmers provide labor

Farmers are convinced they will benefit

- ABAAS offers guaranteed offtake
- ABAAS offers attractive prices
- ABAAS service package leads to increased production
- ABAAS is a reliable partner

Engaged farmers who are committed to deliver on the contract

- Own personal farm and see block farm as additional income source
- Previously cultivated cassava

Contracting

The contract should include key elements that ensure a fair and transparent exchange

- ❑ Legally binding agreement of 1 year
- ❑ Transparent pricing structure
- ❑ Clear payment method and timing
- ❑ ABAAS as sole off-taker of produced cassava tubers
- ❑ Lease of 2ha land on block farm
- ❑ Provision of services & finance

Outcomes

Expected benefits for ABAAS

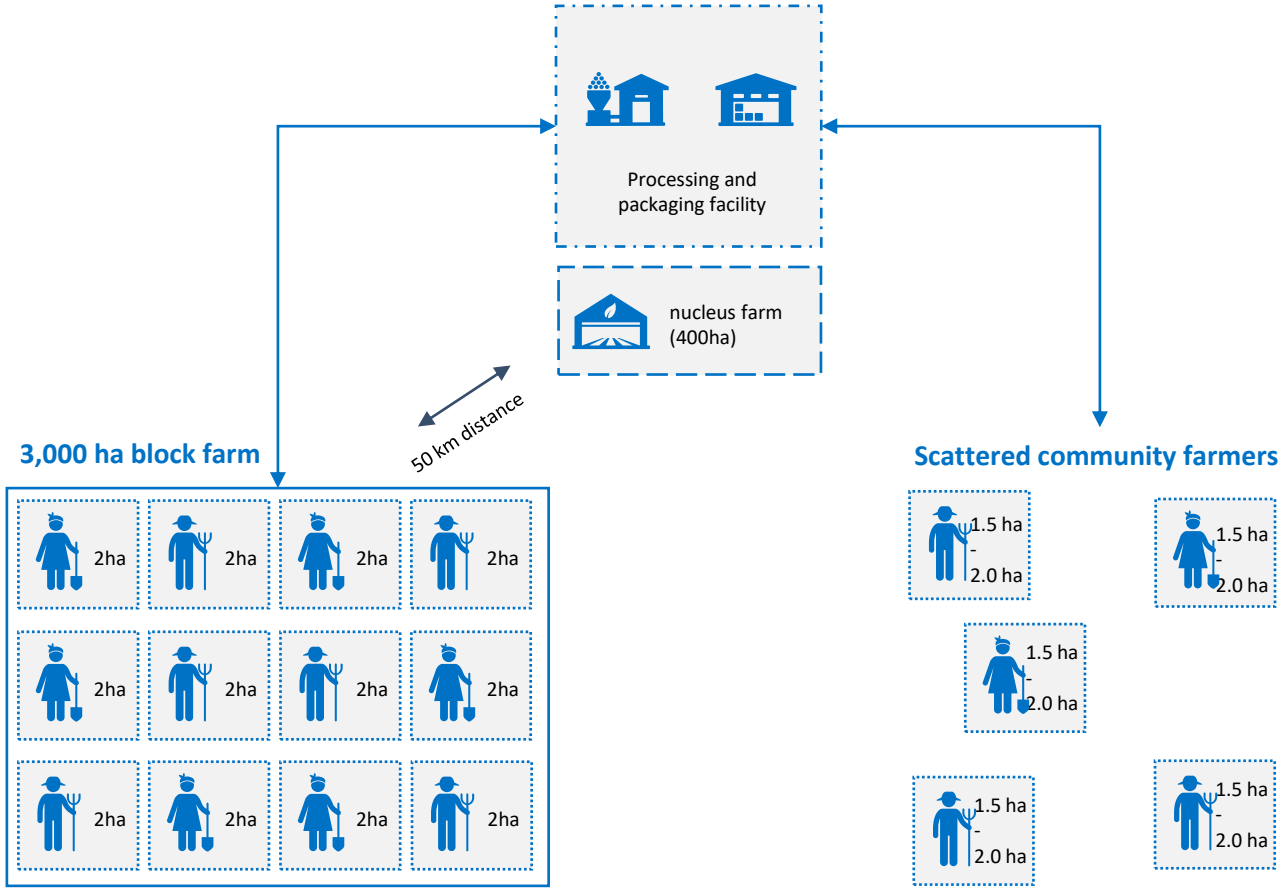
- Secured and predictable supply of high-quality cassava tubers
- High efficiency due to low post-harvest losses

Expected benefits for Farmers

- Increased livelihood through stable additional income source

Sources: 1) ABAAS Business Plan (2018), 2) http://www.fao.org/3/a-i8059e.pdf

An aggregation mechanism delivers tubers to the nearby processing factory, reducing the cost and risks of transport



ABAAS sourcing strategy to decrease risk of quality loss and costs

- To ensure full utilization of the processing facility ABAAS relies on a mixed supply of tubers from block and community farmers. The share of supply coming from block farmers will be scaled up over time as more land is developed. At full capacity, by 2025, block farmers alone can supply the processing facility.
- The total cost for sourcing from a block farmer is higher for ABAAS compared to sourcing from a community farmer due to the higher cost for providing the service package and transportation. These higher costs are justified by a significant decrease in post-harvest losses and side-selling.
- Community farmers have 12% higher post-harvest losses due to the highly perishable nature of cassava tubers, aggregation inefficiencies, combined with the bad conditions of infrastructure in Ekiti state.
- Additionally, community farmers in the ABAAS sourcing model need to hire a third party for the transport of their tubers resulting in high transport cost disincentivizing them into selling to ABAAS, selling 70% as compared to 99% of their produce.
- On the contrary, tubers from block farmers can be processed within ten hours after harvest as ABAAS has better access to the block farmers and arranges logistics in a planned and centralized manner.

ABAAS controls the type of high-quality stems used on the block farms to ensure the level of starch and quantity of supply

Comparison between three cassava varieties

	Local	High-quality
Source	Unknown	IITA
Yield	9.5 MT/ha	20 MT/ha
Maturity period	15 months	12 months
Peak starch content	13%	24%
Multiplication rate	10:1	10:1
Price	Free	Market price: 600 NGN ABAAS price : 500 NGN
Soil type	n/a	Sandy-loomy soil; survives wetter soils
Performance	Disease-prone	Weed resistant Drought resistant Pest and disease resistant

Quality control through own stem multiplication

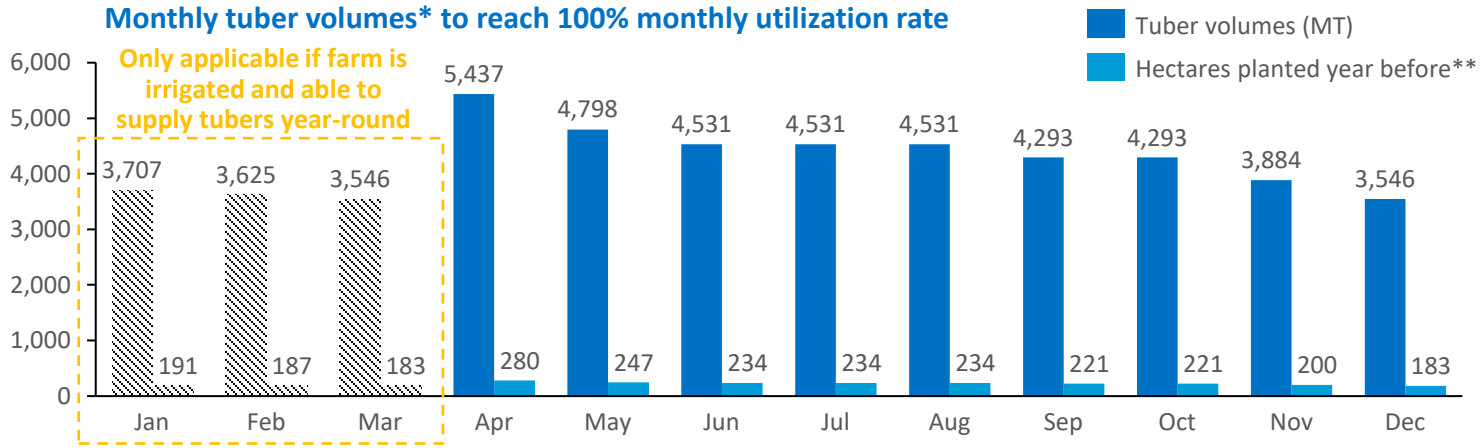
- ABAAS currently uses an improved variety specifically tailored to local soils, and resistant against pests and diseases. This results in higher obtainable yield and starch level contents compared to local varieties.
- ABAAS owns a 400 hectare nucleus farm for stem multiplication. Stems are for own use and sold the block farmers on credit. Through in-house stem multiplication ABAAS can control:
  - Price charged to farmers, on average at below market price
  - Volumes produced through:
    - Multiplication rate: producing 10 new stems per 12-month period
    - Determining which volume is needed at which time, as stems can be stored for max 90 days.
  - Timing of stem supply in line with seasonal demand
  - Stem characteristics: in collaboration with research institutes ABAAS can continuously test and evaluate performance of current and future varieties. The best varieties can be selected, multiplied and brought to market.
  - Starch level: by optimizing the variety, timing of planting and harvest ABAAS can source tubers with high levels of starch content.
  - Yield level: by controlling timing of planting and harvesting ABAAS ensures steady supply of tubers.
- ABAAS can offer stems at below-market rates as the returns materialize in the form of higher yields, increased starch content and higher sourcing efficiency due to controlled timing of planting and harvesting

ABAAS should set up a phased cropping scheme with their block farmers to maximize processing plant utilization

Cassava crop calendar: ideal timing of planting, harvesting and starch content

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ideal timing of planting	Rainy season affects tuber growth				Ideal climatic conditions for early stages of cassava growth cycle					Rainy season affects tuber growth		
Timing of harvest	Not recommended to harvest tubers older than 15 months (i.e., planted previous later Sept latest)			Cassava planted between 12-15 months ago should be harvested to obtain optimal yield and starch content. After 15 months weeds, pests and decomposition severely affect yield and quality.								
Starch content (%)	22%	23%	24%	15%	17%	18%	18%	18%	19%	19%	21%	24%

Monthly tuber volumes* to reach 100% monthly utilization rate



*Obtained by dividing the monthly starch output capacity (833 MT/month) by the starch content of tuber harvested in that month (see upper table)
**Assuming these hectares are planted exactly 12 months before. In reality, the planting timeframe is shorter, necessitating ABAAS to plant the required hectares from Apr-Dec between Apr-Sep the previous year at around 342 hectares per month, or 2,053 hectares per year.

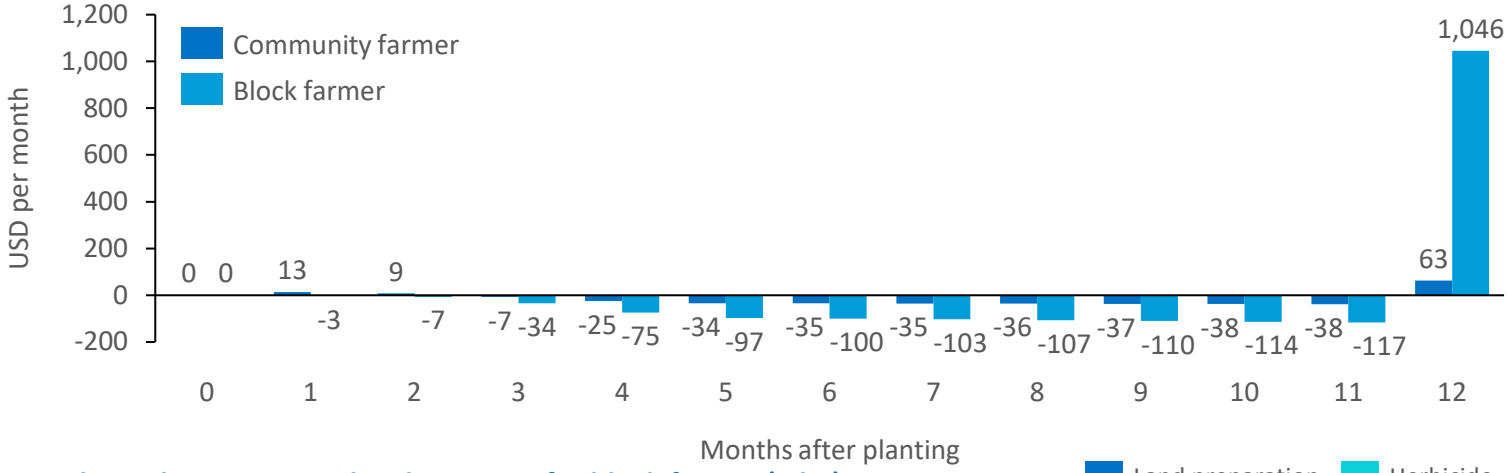
Improving the factory's utilization rate

- A steady supply of quality tubers throughout the year is critical in ensuring a high utilization rate of ABAAS' processing factory. This requires a balancing of:
  - Correct timing of planting of stems given seasonal variability in rainfall. Distributing the volumes harvested evenly across the months
  - Ensuring optimal starch content as influenced by the timing of harvest and time in ground
  - Ensuring optimal volumes of tubers harvested as determined by the time in ground
- Additional levers that can be used to improve the processing utilization rate are the sourcing mix (community versus block farm) and deciding whether to open or close the factory (close if marginal costs outweigh revenues)
- ABAAS uses a cassava variety with a maturity period of between 12 and 15 months and encourages their block farmers to plant between April and August. This enables a harvest cycle that starts in April and ends in December.
- With limited control, community farmers follow their own cycle, planting in May and harvesting after 15 months from August till October.

Provision of services on credit to cash constrained farmers is critical in allowing them to invest in their farms

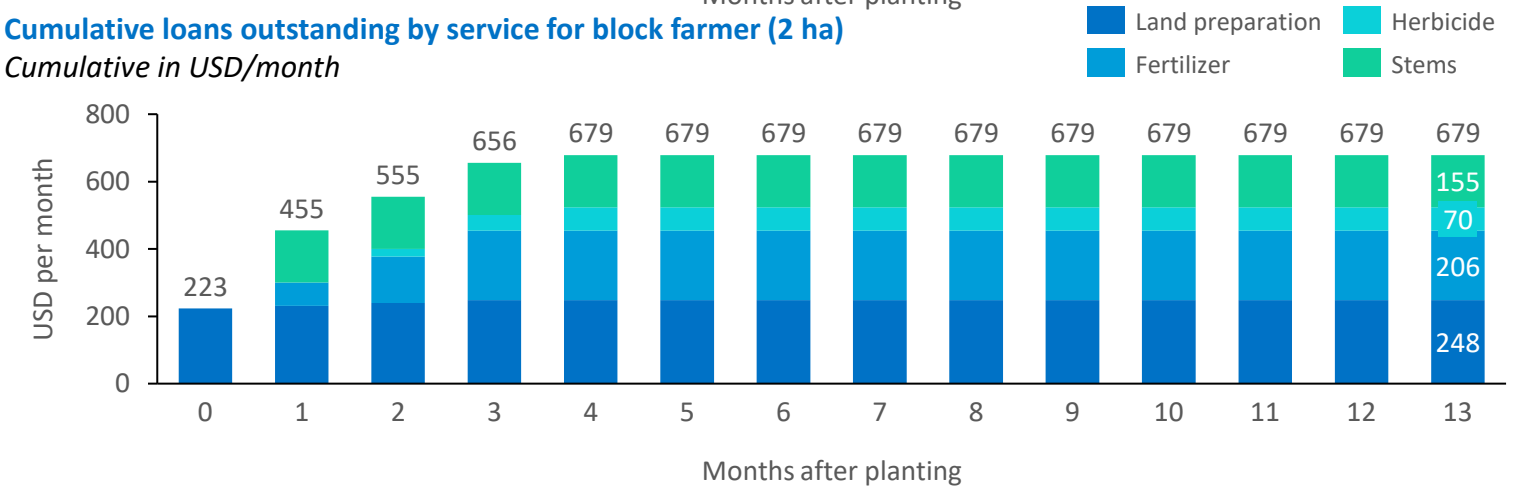
Comparing cash flows of community and block farmer

Cumulative in USD/month/ha



Cumulative loans outstanding by service for block farmer (2 ha)

Cumulative in USD/month

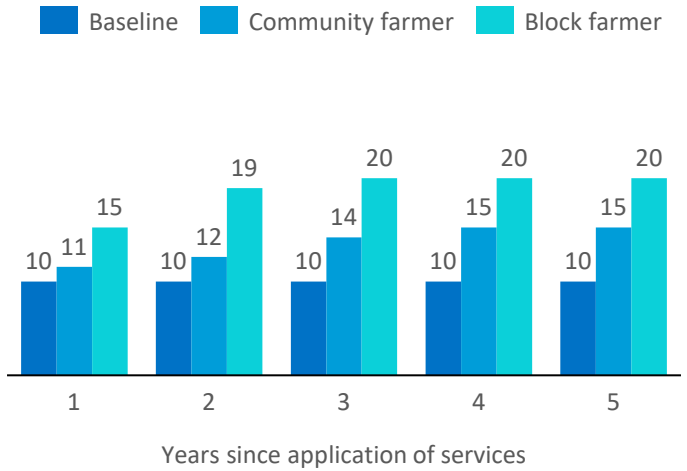


Expanding farm size through on-credit services

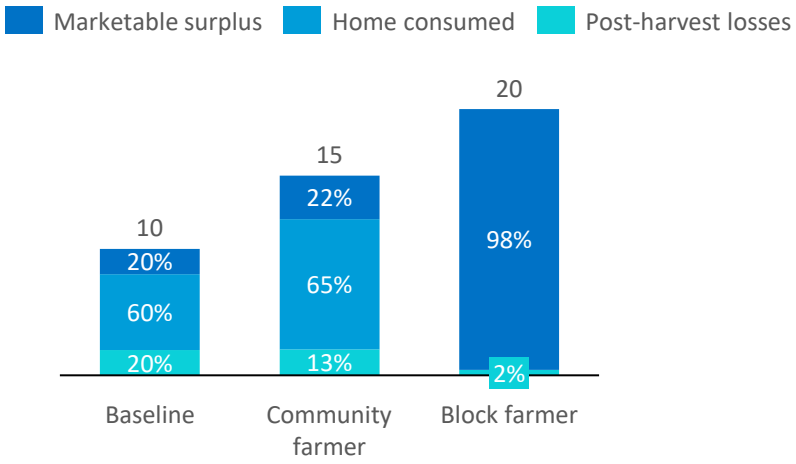
- Services on credit allow a block farmer to invest in high-quality inputs (stems, fertilizer, herbicides) while incurring low cash expenses, comparable to those of community farmers.
- At time of harvest, 12 months after planting, the outstanding loans and interests will be subtracted from the price received for the tubers, leaving block farmers with a considerable amount of net cash in hand.
- Farmers would otherwise never been able to make the $679 per hectare investment in land preparation, fertilizer, herbicides and stems.
- As a result, compared to community farmers, block farmers can cultivate a larger plot (2 instead 1.5 hectares), later expand their plots (up to 5 hectares) and obtain higher yields (20 versus 15 MT/ha), significantly improving their incomes.
- Still, the loans come at a cost. ABAAS charges block farmers with interests on their credit in line with the rates they can obtain. At market rate this would imply 30% per annum, versus 9% per annum when accessing the Anchor Borrowers Scheme.

Improved stems, inputs and mechanization increase yields and starch content. Proximity to factory reduces postharvest losses

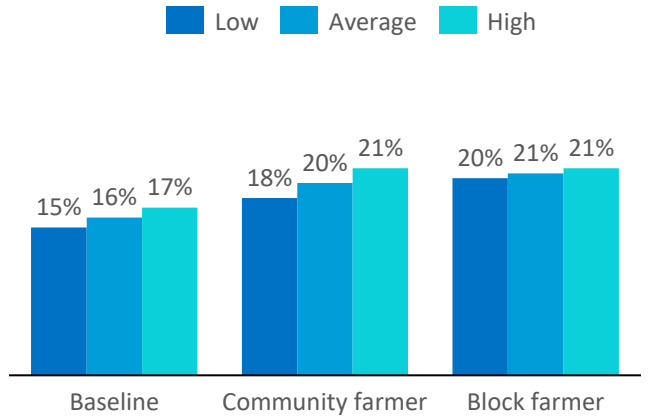
Change in yield per farmer segment



Marketable surplus



Starch content per farmer segment



Cassava yield

- Training on GAP and provision of improved stems increase community farmer yields to 15 MT per hectare. It takes them 3 years to fully adopt practices.
- Block farmers, receiving quality inputs and mechanization services, are expected to harvest up to 20 MT per hectare.

Marketable surplus

- A key driver of farmer profitability is reducing high post-harvest losses prevalent in Nigeria. Training community farmers on GAP reduced PHL to 13%, down from 20% of total harvest. Block farmers, located close to the processing factory incur only 2% PHL.
- While baseline and community farmers still consume most cassava themselves (75% of harvest accounted for PHL), block farmers sell all their cassava to ABAAS.

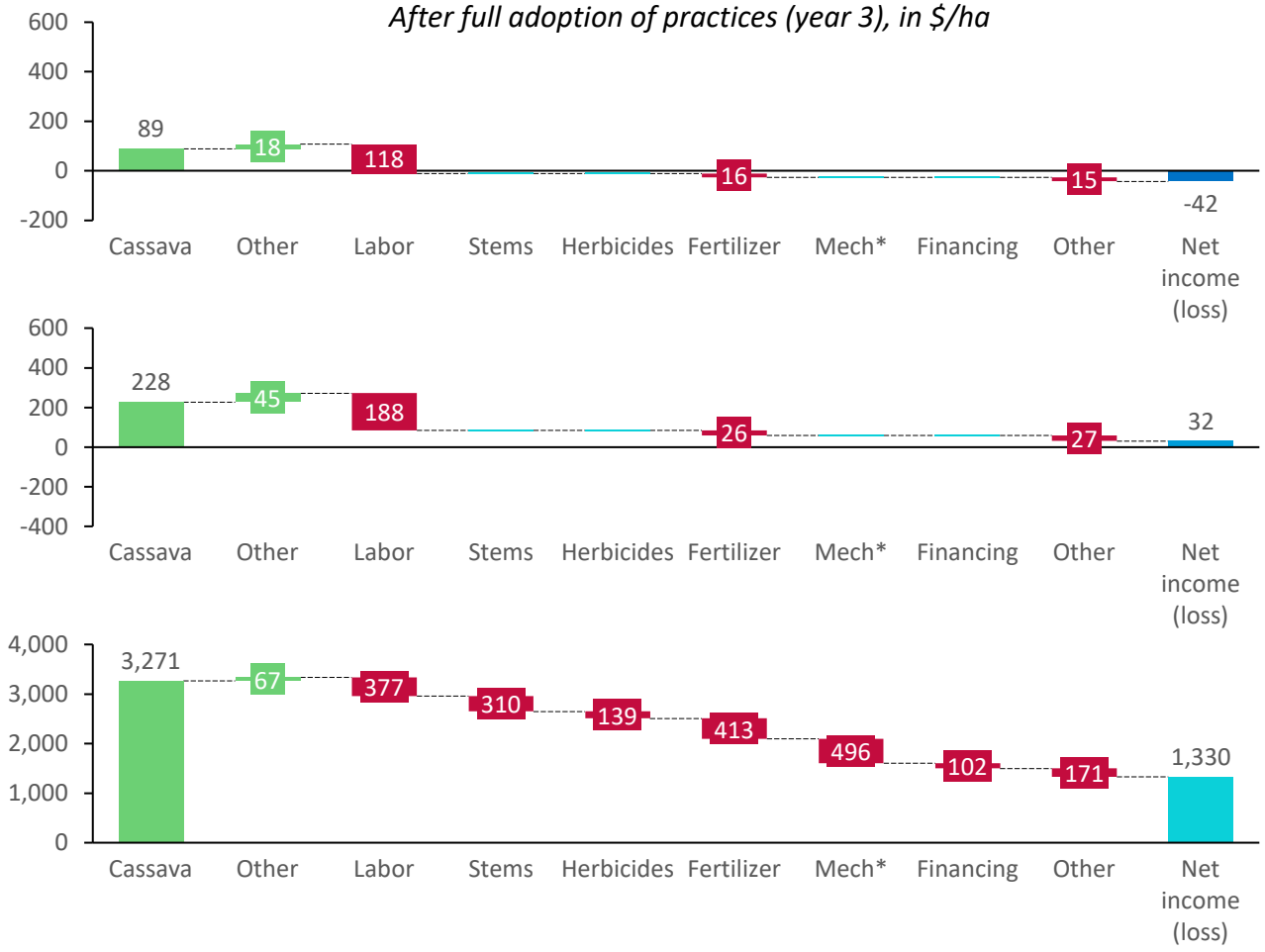
Starch content

- Improved varieties yield cassava with an average starch content of 21% as opposed to 18% for local varieties.
- As the block farms are better managed and provided with improved varieties from the start (as opposed to community farmers), block farmers are expected to obtain, on average, slightly higher starch content.

By providing a clear business case, ABAAS can increase loyalty of community farmers and attract block farmers

Comparing net incomes of baseline, community and block farmers

After full adoption of practices (year 3), in $/ha



Baseline farmers

- An average farmer cultivates 1.25 hectare of cassava.
- With limited resources, farmers are unable to invest in quality inputs and rely mostly on family labour. Yields are low at around 9.5MT/ha
- Correcting for post-harvest losses, a mere 7.6MT/ha of cassava remains, used mainly for home consumption (75%)

Community farmers

- By expanding their farms, adopting GAP and planting improved stems, community farmers can increase yields and starch content, generating up to $75 per farmer in additional revenues.
- Farmers hire more labor and incur additional cost for transporting the cassava to the ABAAS factory. Training and stems are provided for free. In return farmers are expected to sell on average 70% of their produce to ABAAS.
- Still, with 75% of cassava consumed at home and considerable post-harvest losses (13%), farmers are making only a small profit.

Block farmers

- Block farmers earn substantially higher cassava revenues due to high yields of 20 MT/ha, only 4% post-harvest losses and selling 100% of produce to ABAAS.
- Compared to community farmers, block farmers' expenses are 380$/ha higher due to purchasing of improved stems, application of more and higher-quality inputs, accessing mechanized ploughing and weeding and incurring interest costs on outstanding loans.
- On top of a higher return, block farmers benefit from guaranteed offtake by ABAAS and are insured against crop damage due to climate extremes.

ABAAS benefits from implementing inclusive policies and services while lifting key barriers to women economic empowerment

Best practices

Set targets on the number of male and female farmers you are aiming to reach, and create a plan that will help you achieve your target, recognizing that this may require a tailored approach.

Develop and enforce human resources policies on sexual harassment, anti-discrimination, fair compensation, parental leave, fair recruitment and/or fair hiring, to support the development of a safe work environment.

Develop and protect safe reporting procedures for victims of violence (e.g., trusted advisors, emergency hotlines); ensure employees are trained to handle different potential cases.

Consider incentives that would encourage women to participate in block farming. For example, transport provision for women who may be very far from the block farm.

Recruit women in groups that are already self organized. Foster women's leadership-by encouraging the leaders of the women's groups to be lead farmers.

Include financial literacy in training (saving, budgeting, investment) to strengthen women's economic empowerment. Engender training methodology for new recruits.

Foster the use of mobile money transfer to women. This ensures autonomy, control of their income, and bolsters financial resilience.

Barriers to be lifted

Practical: accessing the block farms is a challenge to most women. The distance to the block farm is long (about 50km) and not every women can leave their domestic roles to farm so far off.

Cultural mobility: in some of the communities that ABAAS operates in, women are not culturally allowed to work for economic gain. Women are predominantly the primary caregivers in the home and the community therefore they have less time to participate in economic activities.

Economic: women's access and control of resources particularly income is comparatively lower than that of men.

Benefits to ABAAS

Adapting training to women's capacities, literacy rates, time schedules and location leads to **improved yields and quality of produce**[1].

Recruitment of women's is likely to foster **higher loyalty levels** and **increased bankability**[2].

Women's financial resilience is beneficial in household and community resilience and **fosters stable market and constant supply** chains[3,4].

Reduced risk of negative publicity around inclusiveness

Higher probability of attracting international buyers

1. Suri, T., Jack., W., (2016)., The long run poverty and gender impacts of mobile money; 2. IFC (2017)., Investing in women along agribusiness value chain; 3. Davies, M. Baars, M., (2017)., Link-up business case insights: Retrospective learnings from offering bank accounts to savings groups in Tanzania and Kenya; 4. Oxfam., (2016)., Women's Rights in the Cocoa Sector. Examples of emerging good practice

Irrigation can be a worthwhile investment to mitigate against negative short and long-term climate impacts

Irrigation has clear benefits but requires significant upfront investment.

Providing irrigation following a small-scale setup to farmers:

- ✓ allows harvesting cassava year-round (up from 9 months), improving the factory's utilization rate with 33%
- ✓ can improve yields of cassava planted in drier months by preventing water stress (e.g., cassava planted in October yields 60-70% of potential)
- ✓ can boost yields by increasing water supply (trials indicating 200-600% increase)
- potentially worsens already problematic soil erosion
- is relatively expensive* to install (516$/ha) and manage (97$/ha per year)
- is limited by working capital constraints, ABAAS prioritizing land clearing, inputs on credit and sourcing first
- is only effective in areas where the topography allows for irrigation infrastructure and water is available

A positive business case – where ABAAS covers the investment costs and farmers carry the annually recurring operational costs – does seem to exist.

- Below table show the break-even margin in $/MT of cassava required for ABAAS to recoup the irrigation cost within the year, for scenarios with varying irrigation setup costs and annual yield impacts
- For example, considering a 40% yield impact and investment cost of $750 per hectare, ABAAS should only invest if they are currently earning at least 80 $/MT cassava.

Break-even margin ($/MT) to recoup investment within the year

*Annual yield increase** as result of irrigation*

Irrigation one-off investment cost in $/ha (excl. running costs)	20%	40%	60%	80%	100%
500	$63	$54	$47	$42	$38
750	$94	$80	$70	$63	$56
1,000	$125	$107	$94	$83	$75
1,250	$156	$134	$117	$104	$94
1,500	$188	$161	$141	$125	$113

- Below table shows additional farmer net incomes for various yield impact scenarios, taking into account additional irrigation running and harvesting labor

Farmer additional net income ($/ha)

*Annual yield increase** as result of irrigation*

	20%	40%	60%	80%	100%
Additional income ($/ha)	$39	$209	$379	$550	$720

ABAAS should minimize costs and risks of the investment

ABAAS should:

- first prove the impact and return on investment at small scale before scaling up. For example, a $10,000 investment can cover the first 20 hectares.
- selecting the sites based on maximum potential: where installation is relatively affordable and risk of water stress is high
- select most willing and able farmers for maximum yield impact and minimum risk of ineffective application
- create a sense of ownership with farmers by having them involved in the setup and paying the operational expenses
- prevent run-offs, apply adequate fertilizers and timely plant nitrogen-fixating crops to prevent further soil erosion.
- integrate a climate-smart agriculture module in their farmer training curriculum including irrigation practices and beyond (intercropping, drought-resistant varieties, minimum tillage, mulching, etc.).

*Purchase and installation cost of spray gun, water pump and boreholes covering 4 hectares estimated at 800,000 NGN / 2,065 USD, lifespan of 5 years; annual cost of spraying and pumping covering 4 hectares estimated at 150,000 NGN / 387 USD per year. **Assumes base yield of 20,000 MT/ha/year of an unirrigated plot managed by a block farmer

An optimal mix of block and community farmers allows ABAAS to run a cost-effective and sustainable business

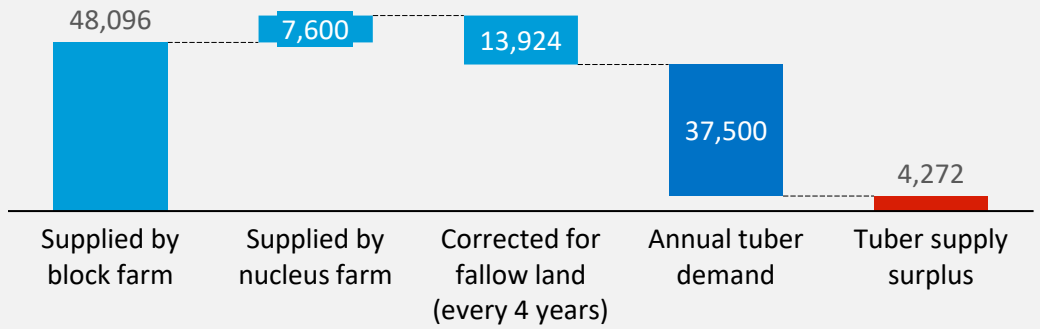
Adding community farmer supply to the sourcing mix

While sourcing from block farmers should be prioritized as it provides many benefits (see overview), adding outgrowers to the sourcing mix does not appear to be necessary but could be an affordable alternative.

- It seems ABAAS can easily supply the factory through its combined production of block farmers and the nucleus farm, even when correcting for leaving 25% of the 3,000 hectares fallow.
- It can be more affordable as it reduces upfront total loans outstanding as sourcing from community farmers does not require extending 679$ credit per hectare for a period of on average 13 months – see graph and table to the right.

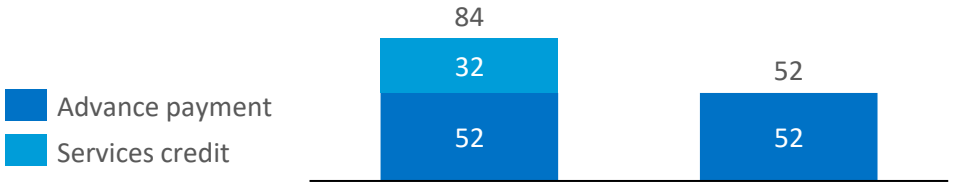
Tuber factory demand and potential supply from own production (>2024)

MT tubers per year assuming 2,000 farmers cultivating on average 2 hectares



ABAAS credit outstanding per MT sourced

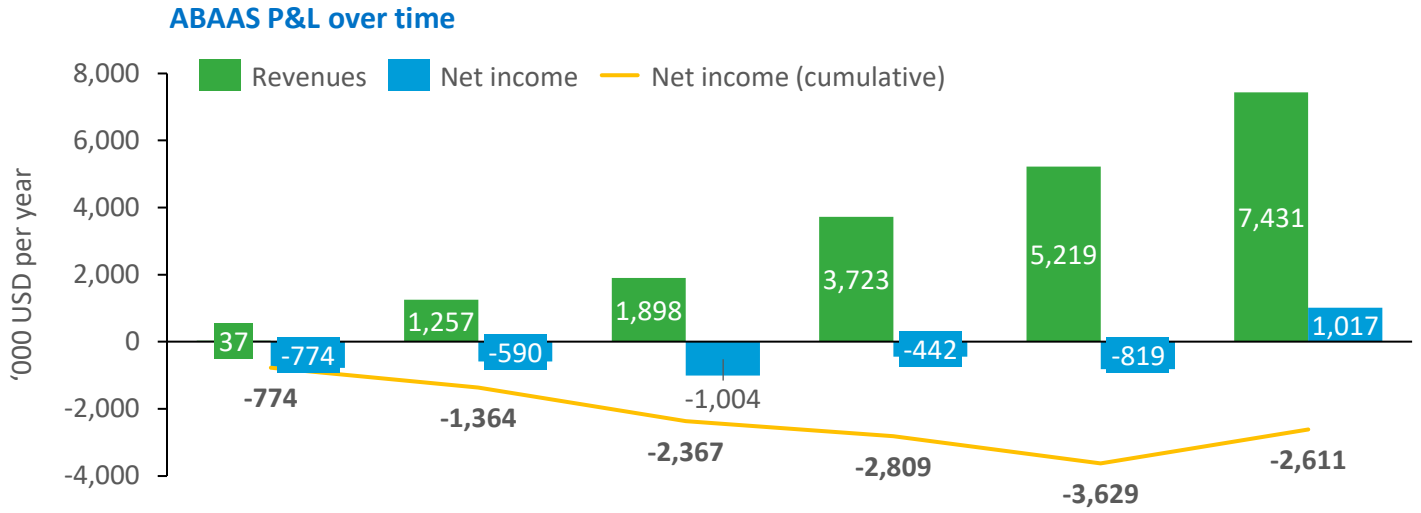
In USD, after harvest and before receiving payment from buyers



Indicators	Block farmer	Community farmer
Training cost	11$/farmer	11$/farmer
Service credit	679 $/ha	0$/ha
Months outstanding	13 on average	0
Cost of finance	0% (carried over)	0%
Default costs	14$/farmer	0$/farmer
Sourcing per farmer	39 MT tuber	6.5* MT tuber
Distance	50km	50km

*Assumes full capacity of 15,000 MT starch output per year at 9 months operational and average starch content of tubers sourced at 20%
** Assumes a yield of 15 MT tubers/year, 13% post-harvest losses, 75% of production home-consumed and 70% sold to ABAAS versus other buyers

By growing gradually ABAAS can minimize the need for and cost of external financing. By 2025 does ABAAS make a net profit.



Indicators	2020	2021	2022	2023	2024	2025
Processing facility	Construction	Operational (7,500 MT @ 9 months full capacity)				
Nucleus farm (hectares cleared)	0	50	100	200	400	400
Block farm (productive hectares)	300	550	1,500	2,000	3,000	3,000
Total FTE	68	69	71	72	73	73
Tractors	1	6	9	9	9	9
Peak credit outstanding ('000 USD)	81	216	407	939	1,799	1,953

A balanced growth rate

- ABAAS must balance fast growth to supply the factory with sufficient tubers and gradual growth to reduce working capital peaks and cost of finance.
- At full capacity (>2024), ABAAS is able to make an annual net income before taxes at around 1.0 USD million, accounting for 25% of fallow lands. Everything else constant ABAAS is expected to breakeven in 2028.
- Fixed, recurring costs are the processing factory depreciation and finance costs, totalling 0.2 USD million per year.
- A major one-time investment is the clearing costs of 3,000 hectares of land, at a total of 1.9 USD million up to 2024.
- Main costs increasing as ABAAS expands are sourcing and nucleus farm operations at 1.7 and 2.0 USD million per year by 2024.
- Short-term working capital is required to extend services on credit, at 1.0 million at peak by 2024.

A proven commercially viable business model with social impact can unlock commercial and impact finance

Livelihood

Income increase – ABAAS supports 1,483 block farmers in increasing their livelihoods, adding $546 per year towards 2023 and close the gap with the poverty line of $912 per household per year. To reach the living income benchmark ($2,646 per household per year) block farmers would need to further increase their yields. 2,500 community farmers also see an increase of 133$ per year in their livelihood.

Income stability/security – A price guarantee in the contract between ABAAS and block farmers ensures the farmer's livelihood in periods of lower market prices.

Gender

Female farmers land ownership –By assigning the contract to the block farmer itself, female farmers are given access to land and finance, circumventing the lack of statutory land rights and collateral. ABAAS aims to recruit 40% female block farmers.

Food security

Additional income – Providing farmers with the opportunity to rent an additional plot of land for cultivation, thus supporting farmers in obtaining an additional income source and enabling them to use 100% of their own farm for own consumption.

Climate resilience

Offset crop loss risk – To offset the increasing prevalence to negative climate events and its associated risks to the farmers and ABAAS' business, ABAAS is paying for crop insurance to ensure a continuance of block farmers' livelihoods in case of droughts and floods.

Farmer resilience – The use of high-quality drought-resistant stems has reduced the impact of droughts on farmers' yields to 6.5% on average and contributes to securing the block farmer's livelihood. Irrigation infrastructure will further the chance of crop damage due to water shortage.

Unlocking the Anchor Borrowers Program with the Bank of Nigeria will enable ABAAS' to create additional value at farm level

Anchor Borrowers Program (ABP)

The ABP, launched in 2015 by the Central Bank of Nigeria, to create an economic linkage between anchor companies involved in the processing (ABAAS) and smallholder farmers (block farmers) of certain commodities. Anchors sign agreements with farmers to whom they supply inputs in exchange for guaranteed sales of a proportion of the crop at a pre-agreed price, with the cost of inputs deducted from these sales.

Key details:

- Anchors have access to funding at 9 %, which is less than the going market rate of 30%.
- CBN guarantees half the value of any loan defaults.
- Farmers need to be organized in cooperatives.

Impact

Farm level

ABAAS borrows credit from the FI and carries both the credit and the interest rate over to the farmers.

→ The lower the interest rate, the lower the cost for the farmer, resulting in higher farmer net income.

→ From 2022 onward, when the block farm is fully operational, a total of $351,000 per year can be saved when charging 9% instead of 30% to all farmers (see graph below).

SDM level

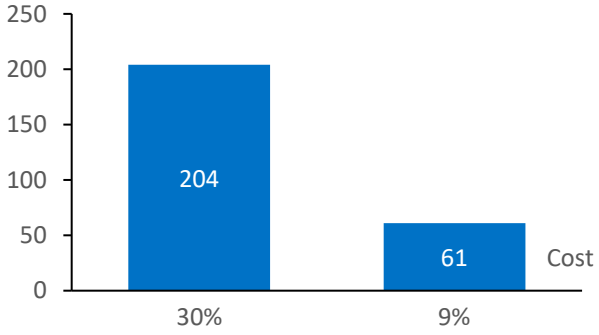
ABAAS also accesses credit from the FI for other purposes:

- OPEX: Working capital to acquire the produce from the farmer and pay the farmer timely
- CAPEX: Capital for investments such as land clearing the block farm to scale up the number of block farmers and to expand the nucleus farm for stem multiplication

→ The lower the interest rate, the faster the SDM can scale up and increase profitability.

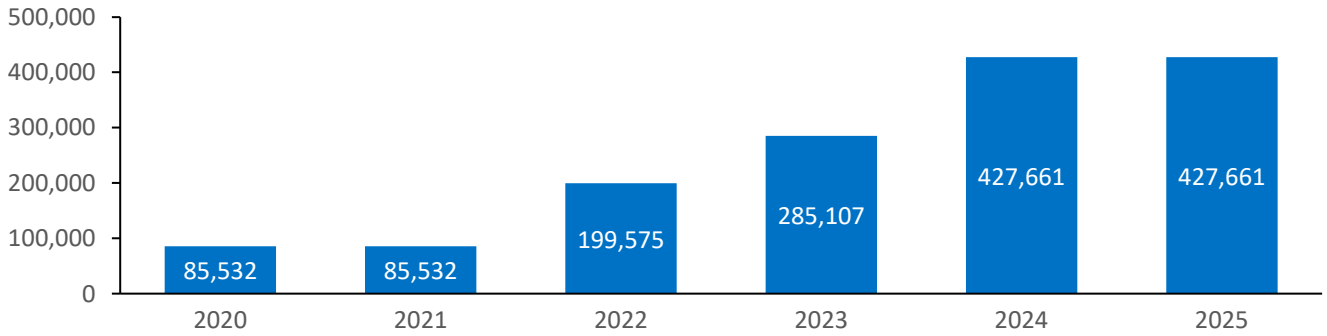
Annual cost of finance

In USD per hectare for different interest rates



Total annual value created at farm level

In '000 USD per year



Sources: CBN (2016) https://www.cbn.gov.ng/out/2017/dfd/anchor%20borrowers%20programme%20guidelines%20-dec%20202016.pdf

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Legend

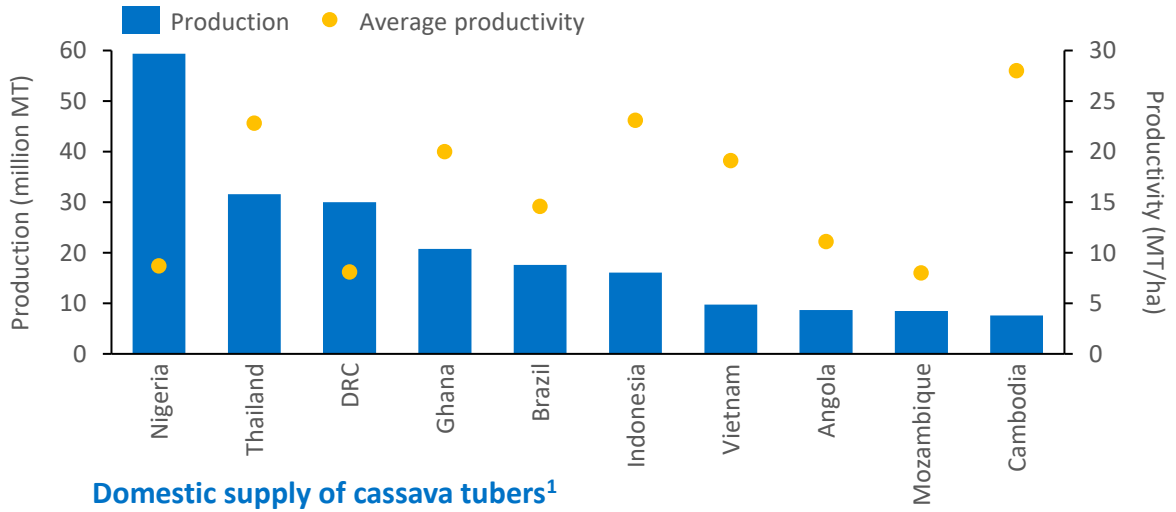
1. CONTEXT

Understanding the cassava value chain

Although productivity is low, Nigeria produces 21% of global cassava. Production and land area have stabilized since 2014.

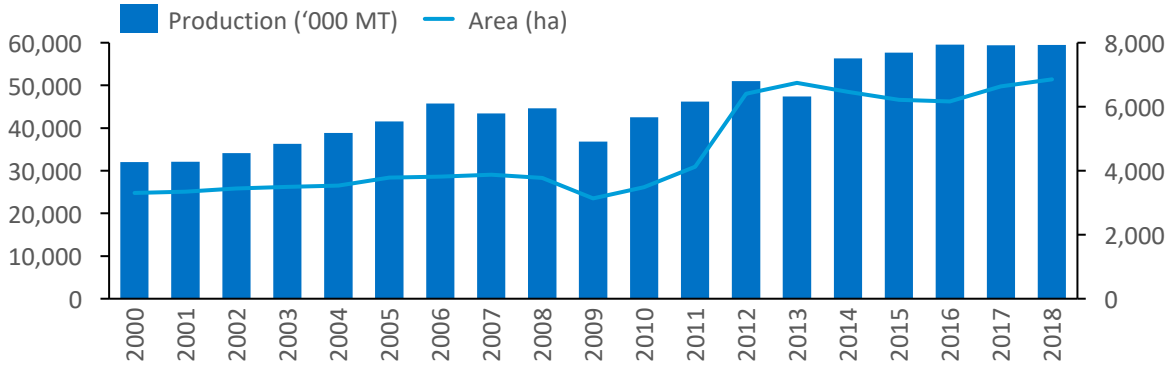
Top 10 cassava producing countries[1,2]

Production per million MT and productivity of MT per hectare in 2018



Domestic supply of cassava tubers[1]

Total cassava tuber supply per '000 MT



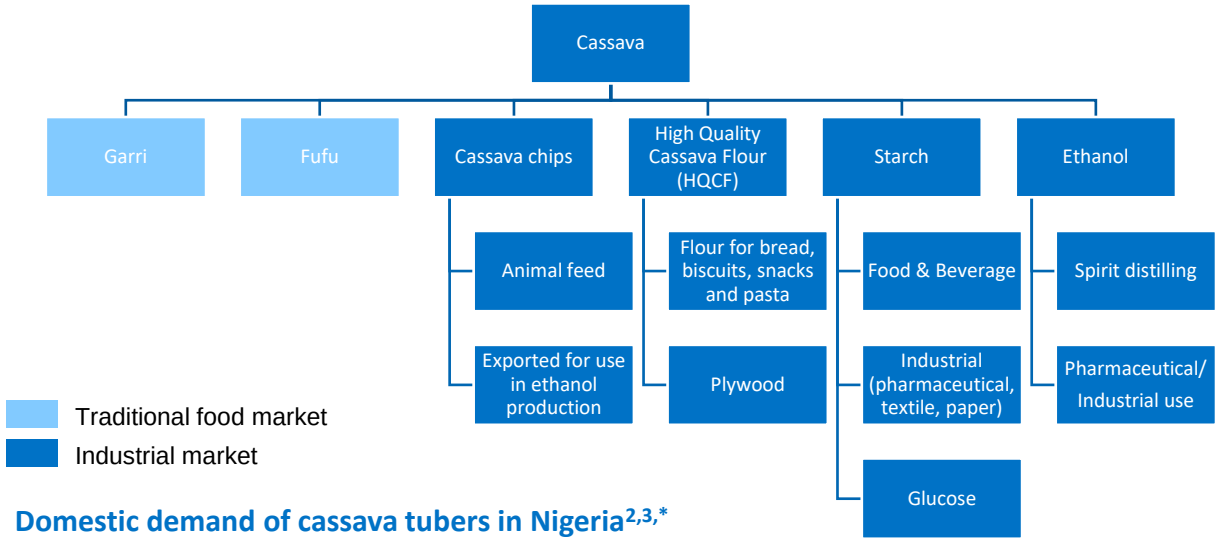
Large volumes, low productivity

- Nigeria produces 59 million MT of cassava annually (21% of global supply) on a cultivated area of about 6.8 million ha[1].
- Since the 90s cassava cultivation has grown enormously and in production volume terms is the most grown crop in Nigeria, primarily due to rapid population growth, large internal market demand, complemented by research to improved varieties of cassava and the governments' ATA program to reduce food imports in cassava and rice[5].
- However, productivity in Nigeria is very low compared Asian and Latin-American countries due to low application of fertilizer, poor planting material due to resistance at local level to adopt new varieties and a weak agricultural extension system. These issues also arise in the neighboring African countries, leading to similar results of low productivity[2,4].
- Although the cultivated area has been slightly increasing over the years, the lack of addressing the main issues in Nigeria's cassava value chain have led to a stabilization of domestic production[1].

Sources: **1)** FAO (2018). FAOSTAT database. 2) Dalberg (2015). Market Opportunities for Commercial Cassava in Ghana, Mozambique, and Nigeria. 3) ABAAS Cassava business summary (2019). 4) CAVA, Cassava: Adding Value for Africa (2013). 5) FAO Cassava development in Nigeria

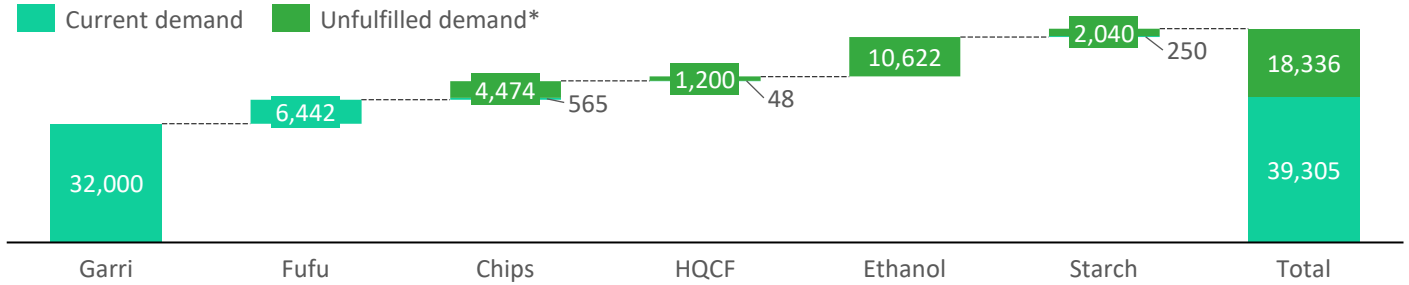
In contrast to other countries, in Nigeria cassava is mainly used for food consumption (90%) instead of industrial applications.

Cassava derivatives and their uses [2,3]



Domestic demand of cassava tubers in Nigeria[2,3,*]

*Annual domestic demand per '000 MT** in 2011*



Nigerian use of cassava and its derivatives

- Cassava being available all year round, drought-resistant and easily storable under the ground for months have made it a key crop for food security in Nigeria[4].
- Especially, cassava derivatives Garri and Fufu are traditionally part of Nigerian diets, being basic food sources of low-cost calories. It is estimated that 37% of the dietary energy of Nigerians comes from cassava[4].
- Other cassava derivatives have enormous potential for use in industrial processing. Given its versatility and high starch content, it can be transformed into four main product categories: 1) Chips for animal feed, 2) HQCF for the baking industry, 3) Starch for the food, beverage pharmaceutical and textile industries, and 4) Ethanol for the spirit distilling industry
- Research states that 90% of the cassava supply is used as traditional fresh food staple and 10% for commercial/industrial purposes. However, commercial supply appears to be even less than that. Amounting up to only 1-2% of the total supply of cassava tubers[2,3,5].
- In neighbouring African countries cassava is also mainly consumed in traditional markets and only between 1-6% in industrial markets. However, in Asian countries and Brazil the ratio is reversed with cassava feeding mainly into industrial markets[2,3,5].

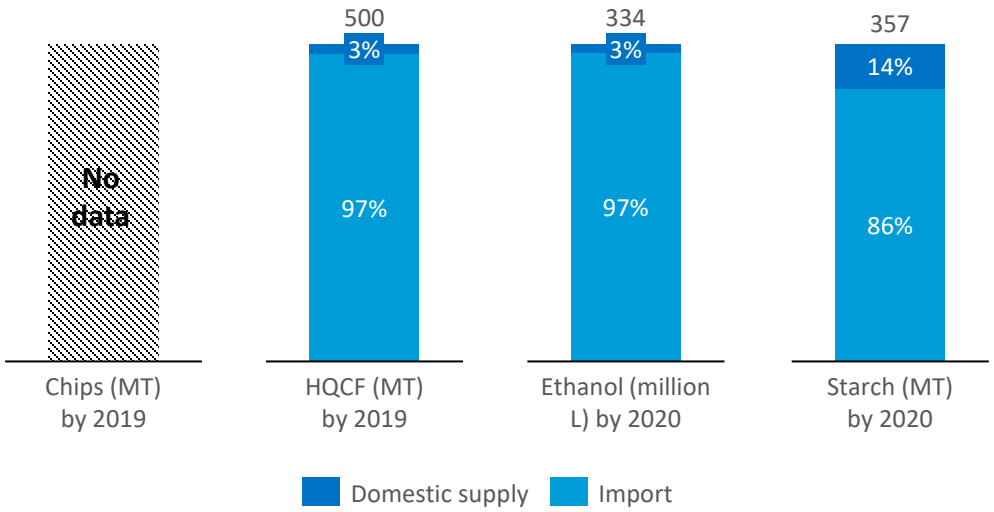
* Demand estimations include growing markets and new markets due to substitution of other produce by cassava derivatives

** Demand for cassava tubers has been estimated by converting demand for derivatives into amount of cassava tubers using conversion ratios of (4.5:1), (5:1), (4:1), (3:1) and (6:1) for garri, starch, HQCF, chips and ethanol respectively

Sources: 1) FAO (2014). FAOSTAT database. 2) Dalberg (2015). Market Opportunities for Commercial Cassava in Ghana, Mozambique, and Nigeria. 3) CAVA, Cassava: Adding Value for Africa (2013). 4) IITA Cassava. 5) IDH and GrowAfrica (2015) Market opportunities for commercial cassava in Ghana, Mozambique, and Nigeria

Sourcing and processing inefficiencies and resulting low margins hinder domestic supply in meeting domestic demand

Domestic supply and import levels of cassava derivatives in Nigeria[4,5]
Annual domestic supply and import per '000 MT

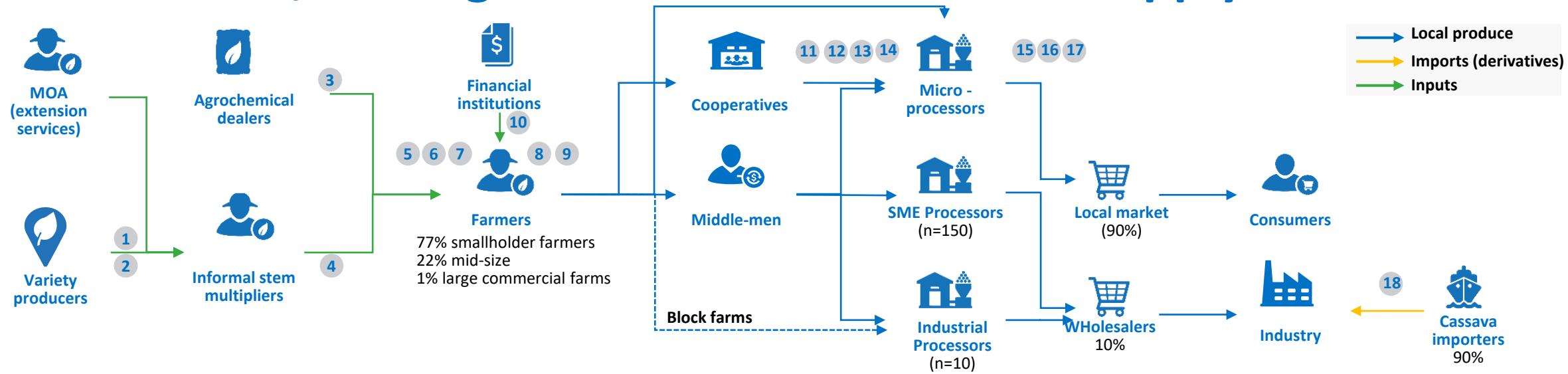


Sources: 1) FAO (2014). FAOSTAT database. 2) Dalberg (2015). Market Opportunities for Commercial Cassava in Ghana, Mozambique, and Nigeria. 3) ABAAS Business Plan (2018). 4) CAVA, Cassava: Adding Value for Africa (2013). 5) Guardian (2019) Tapping economic benefits of rising cassava starch industry in Nigeria. 6) Cassava, a 21st Century Staple Crop: How can Nigeria Harness Its Enormous Trade Potentials (2019)

Domestic demand for cassava derivatives

- Nigeria imports large quantities of cassava derivatives to address the large domestic demand and the supply deficit. This is due to:
  1. Insufficient processing capacity as the sector lacks investments,
  2. A less efficient way of sourcing and processing,
  3. Combined with higher farm-gate prices for tubers resulting into higher production costs compared to major derivatives producing countries, and
  4. The misalignment between domestic processors providing supply and the industry providing demand disincentivizing cassava cultivation[2,4].
  5. Policy inconsistencies as the government is yet to enforce or implement certain policies that would increase cassava production and usage at commercial level, i.e. the inclusion of 10% HQCF as flour substitute in bread and the blending of ethanol in petrol[6].
- National starch demand is around 350,000 MT annually, while current national production can only address 10-20% resulting into importing more that 80-90% of the starch needs.[3]

The cassava sector is highly-fragmented and scarcely industrialized, leading to unstable demand and supply



Inputs

1. IITA and NRCRI have developed over 40 new varieties with high starch content, resistant to pests and high yielding
2. Lack of an efficient government seed system and insufficient quantities of stems encouraged informal stem multiplication and trade between communities
3. High-quality inputs are unavailable or unaffordable for the farmers

Cultivation

5. Few farmers own land and land tenure rules are unclear, discouraging land investments
6. Low market access and demand information asymmetry makes farmers sell at low prices and at the farm-gate (20%)
7. Slowly increasing yields (from 10 to 12 ha/MT) due to uncommercial farming, lack of farmer interest in new varieties and low application of GAP
8. Agrochemicals and fertilizers are scarcely applied due to high cost and little knowledge on proper application
9. Most labour is done manually as mechanization is costly
10. No access to finance

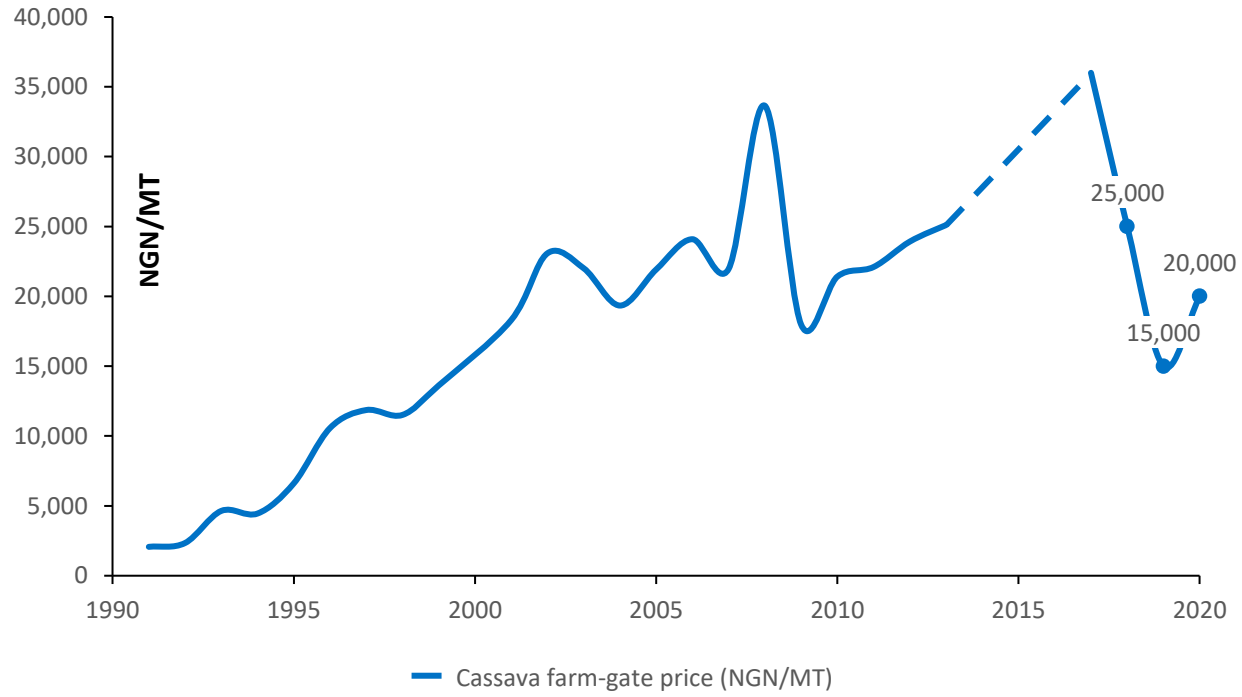
Processing

11. High coordination (transaction and transport) costs sourcing from large amount of small scale farmers
12. A myriad of small-scale traders
13. Lack of rural buying centres to collect tubers
14. Difficult to source sufficient fresh tubers due to competitiveness
15. High operating costs (electricity for plant)
16. High farm-gate price fluctuations (seasonally and annually) impacting processor margins
17. Operating below full capacity due to inconsistent demand from end-users
18. Import of derivatives due to inconsistent supply and import policies

Sources: Sources: 1) CAVA, Cassava: Adding Value for Africa (2013). 2) Dalberg (2015). 3) CGIAR (2019). 4) CTA (2012) Cassava Stem Multiplication Technology

Cassava prices have been rising since the 90's. Seasonal and regional fluctuating prices encourage side-selling

Cassava farm-gate price (NGN/MT) 1991-2018[1,2]



Sources: 1) FAO (2014). FAOSTAT database. 2) Dalberg (2015). Market Opportunities for Commercial Cassava in Ghana, Mozambique, and Nigeria. 3) CAVA, Cassava: Adding Value for Africa (2013).

Cassava farm-gate prices fluctuate heavily

- Farm-gate cassava prices are very volatile within and between seasons[2].
- In Nigeria cassava is characterized by a cycle of glut (excess cassava) with depressed prices that regularly occurs every three to four years following a period of scarcity and high prices[2,3].
- Large seasonal and regional fluctuations in cassava supply enhance price volatility[2]. With the boom in industrial demand for high-quality cassava, there are now several large processors competing for the relatively limited high-quality cassava produce.
- Sudden changes in farm-gate prices make farmers more susceptible to side-selling at prevalent market prices, decreasing farmer loyalty. Farmers selling at open market prices will be able to increase an otherwise low net income.
- All processed produce, except garri, are sold at constant prices eroding processor's margins when tuber prices increase[3].

Cassava is mostly grown by poor smallholder farmers lacking inputs and markets in marginal and uncertain environments

Farmer & Household Characteristics

Age: The average age of cassava farmers is 52.

Education: Most did not complete primary school[4]

Household size: 5 people[4]

Head of HH: Male[4]

Location of the farms: Ado Ekiti (Ekiti state)

Household Income

Revenues from crop: A traditional cassava farmer of 1 ha with average yield of 9.5MT/ha has an average net income between 100,000 and 230,000 NGN(280-650 USD)[3].

Revenues from other crops: 65,000 NGN per year. Which could amount to 15-31% of total revenues, cassava farmers earn additional income through intercropping[3]. Other crops include maize, watermelon or cowpeas

Revenues from non-agricultural activities: No other revenues[3].

Financial & Digital Behavior

Phone: Most farmers own a phone (85 percent). But only 30% farmers uses it for financial transactions.

Bank account: 40% has a bank account.

Loan: Most farmers have no access to affordable loans, limiting farmers to adopt improved practices

Cassava Farm

Ownership: Owns land (76%)

Farm size: 0.5-2ha

Cassava farm size: 0.5-2 ha (~100% of total farm)

Other crops: Most farmers grow diversified crops, mainly maize, watermelon and cowpeas.

Animals: 65% of the farmers own livestock[4].

Farming activities: Cassava farms are generally run by families with both men and women working on the farm

Sources: 1) CAVA, Cassava: Adding Value for Africa (2013). 2) Dalberg (2015). 3) CrestAgro and Psaltry SDM analysis (2018). 4) DHS Nigeria (2018)

Post-harvest challenges, unpredictable prices and land tenure issues are the main risk-factors impacting ABAAS

Risk level: Low | Average | High

Definition	Challenges related to cassava production and processing	Risk/cost to SDM
Environment	Cassava further depletes the soil. The region is very drought prone.	Droughts could significantly reduce the yields of ABAAS's farm, leading to insufficient cassava tuber supply for optimal utilization of the factory.
Infrastructure	Rapid post-harvest deterioration restricts storage of the fresh tuber. Lack of available transportation to the off-taker leads to direct physical loss of tubers. Post-harvest deterioration causes a further reduction in root quality	ABAAS must source from a larger number of farmers and travel long distances to get adequate supplies of cassava, driving up costs. If unable to secure enough fresh cassava, ABAAS may not be able to meet orders from off-takers.
Labor	Most labor is done manually by the family	
Inputs & Financing	Quality inputs are usually not available or affordable. Financing is not available	Low cassava yields would lead to insufficient cassava tuber supply for sustainable use of the processing factory.
Trading system	Difficult and uncertain market access leads to low willingness to invest in improving productivity The government is sufficiently encouraging the substitution of imported goods by domestically produced cassava derivatives through import tariffs.	Low cassava yields and uncertain or unsteady supply of cassava tubers would make ABAAS's processing factory unsustainable. Inconsistent domestic market demand due to cheaper imported goods could affect the sustainability of ABAAS.
Pricing & Competition	Farm-gate prices vary interannually due to periods of over- and undersupply. Due to its perishable nature, farmers need to sell their tubers fast to traders leading to low negotiation power.	Changing farm-gate prices negatively could affect famer loyalty to ABAAS as prices are determined at the beginning of the contract. It could also put pressure on ABAAS' margin if farm-gate prices rise uncontrollable and thereby affect the sustainability of ABAAS.
Institutional	Herdsmen roam around the region with their cattle, destroying crops. The institutional framework is insufficiently adapted to protect landowners.	Destruction of cassava tubers could lead to insufficient cassava tuber supply for sustainable use of the processing factory.
Land Tenure	Land is often held on a communal basis, inherited or rented; purchase of land is rare.	ABAAS will establish a block farm allowing farmers to cultivate a plot of land without having to own the land.
Social Norms	Traditional production is often seen as a 'woman's crop' due to its use as food, low risk and input requirements. Commercial production is dominated by men due to gender division of labor and control over resources.[1)]	Potential to miss the opportunity to make significant progress on improving women's financial and decision-making positions.

Sources: 1) Forsythe, et al. (2016). A crop of one's own? Women's experiences of cassava commercialization in Nigeria and Malawi. 2) Cassava peeling is the biggest challenge in cassava processing (Jimoh & Olukunle (2012)

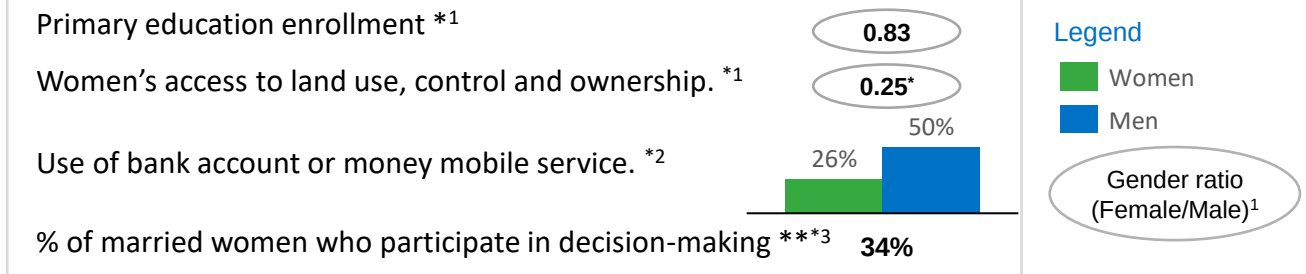
A block farm contract could overcome disparities in women's lack of decision-making power and control over land and assets

Enabling environment

At the national level gender disparity in primary education is not significant, although enrolment is slightly in favor of men.

Access to land use, control and ownership is highly skewed to men. Women's lack of access control of asset reflects disempowerment.

34% of women make household decisions either solely or jointly. The ability of women to make decisions solely or jointly reflects agency and empowerment.



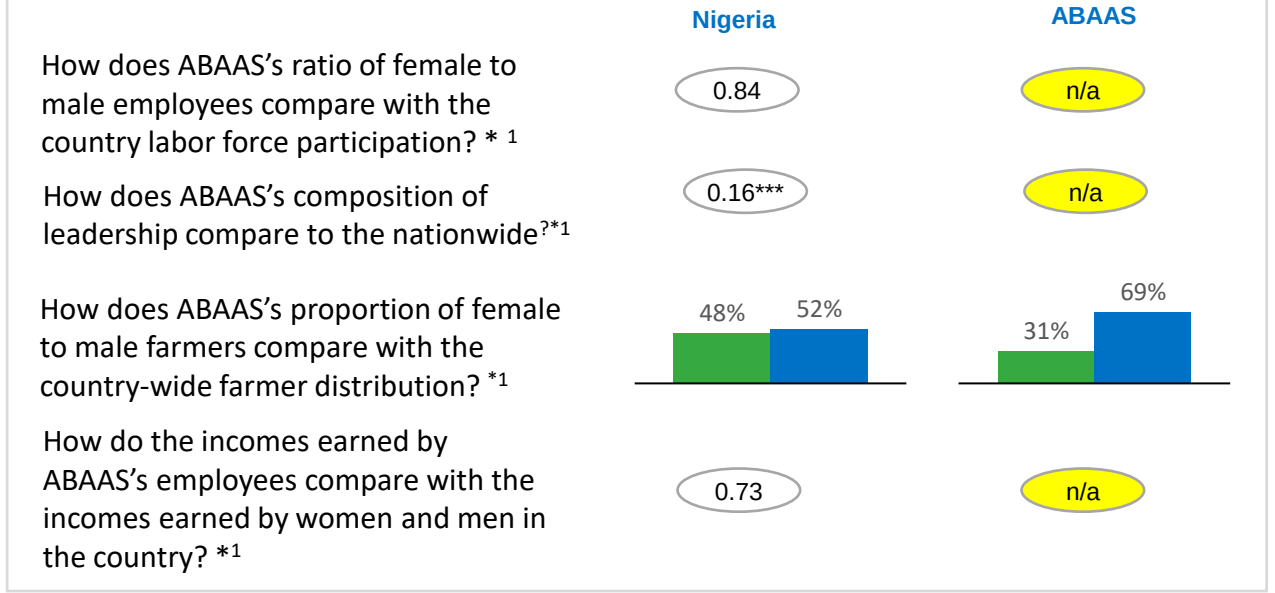
Comparison of ABAAS to the national context

At the national level, country labor force mostly comprises of men- implying less women participating in labor force.

At the national level women's leadership is quite low, this is also reflected in political spaces, company boards and women who own firms.

Women comprise 48% of labor force in agriculture at national level and 31% at ABAAS. **In cassava farming, women show a dominant role in cassava production in Nigeria, influencing about 62% of the whole agricultural labor in the south-western part, 71% in the south-eastern and 59% in the central zones**.*4

At the national level men earn more that women, lack of access to a source of income is demonstrative of disempowerment.



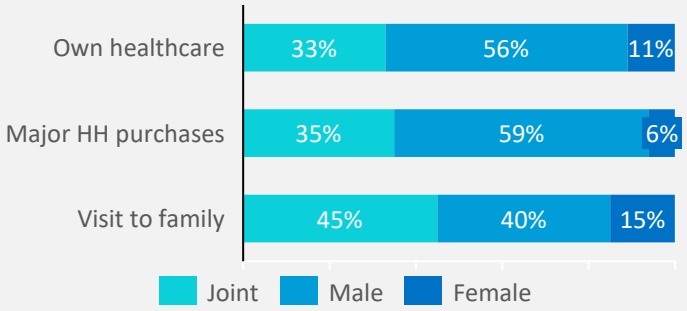
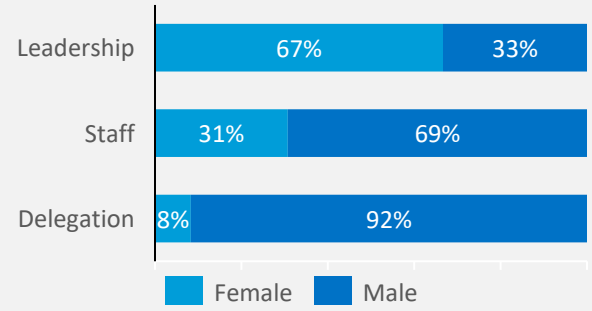
* Divide female indicator by male indicator to get ratio. A ratio of 1 indicates parity between the sexes; a ratio between 0 and 1 typically means a disparity in favor of males; whereas a ratio greater than 1 indicates a disparity in favor of females. http://reports.weforum.org/global-gender-gap-report-2020/dataexplorer/#economy=NGA ** Where 0= worst score and 1= to the best score; *** Where 0= worst score and 7 is the best score

Sources: **1)** World Economic Forum (2020): Global Gender Gap report; **2)** World Bank (2017): Global Findex; **3)** Demographic and Health Survey; 4) Osuji M.N. (et al)., (2017)., Cassava Value Chain mapping and Gender Role Analysis in Southeast Nigeria

Assessment of Gender-related risks and opportunities

Women perform a key role in the production of cassava but remain unrecognized

Gender Dynamics:

Category	Decision making	Decision making on Productive activities	Women in Leadership
Score	**Needs attention**	**Unable to assess**	**Needs attention**
Data	**Women's involvement in decisions[1]** 	**No farm-level data available**	**Women in leadership[2]** 

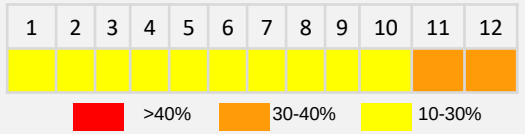
Category	Description of involvement	Detailed description of risk	Expected Impact
Involvement in household Activity	For elements of domestic work which are not traditionally associated with men – washing clothes, cleaning the house, cleaning the bathroom/toilet, and preparing food – participation of men is low[4].	• Disproportionate load of unpaid care work • Limited time to engage in productive/economic activities and in training on GAP (time poverty)	• Women's exclusion of effective participation in agricultural value chains • Lower Farm yields • Unsustainable agricultural value chains
Involvement in Farm Activity	In South West, women work 30% less hours per week on agricultural activities in the post-planting and post-harvesting season[3]. However, in the cassava value chain women are generally highly involved (60-80%), especially in weeding and in processing[5].	• Uneven agricultural value distribution-women focused on low-grade and poorly remunerated activities, i.e. peeling and cooking of cassava.	• Role of women invisible in agricultural value chains • Unequal distribution of value along the agricultural value chain

Sources: 1) DHS Nigeria (2018). 2) ABAAS data (2020). 3) LSMS Integrated Surveys on Agriculture Nigeria (2019). 4) Promundo UKaid Nigeria men and gender equality survey (2015). 5) Osuji M.N. (et al)., (2017)., Cassava Value Chain mapping and Gender Role Analysis in Southeast Nigeria

Assessment of Food Security-related risks and opportunities

Cassava can play a major role in regional food security both as food crop as cash crop

Farmer's overall Food Security status

Category	Cash-flow (Stability & Access)	Food Security (Access & Availability)	Assets (Stability)
Score	High risk - needs attention	High risk - needs attention	Average risk
Data	**CASH FLOW** 47% of households in South West are worried about not having enough food to eat because of lack of money[5]. 48% of households in South West are unable to eat healthy and nutritious foods because of lack of money[5]. While at national level it is 37% and 44% respectively.	**FOOD SECURITY** 31 % of households expressed that they face food shortages in the last year – which is similar to the national level. The households in South West are most food insecure in November – December[5]. 	• **Ownership:** 76% of rural households own land[4] • **Farm size:** an average smallholder farm size is between 0.5-2ha [3] • **Cassava farm size:** 0.5-2 ha (~100% of total farm) • **Other crops:** Most farmers grow diversified crops, mainly maize, watermelon and cowpeas [3] • **Animals:** 65% of the farmers own livestock[4]

Category	Income (Access & Availability)	Market (Availability)	Health & Sanitation (Utilization)
Score	High risk - needs attention	Limited risk – no action needed	High risk - needs attention
Data	• **Cassava sold:** 2.5% of cassava is sold [3] • **Crop loss:** 40% of cassava production is lost due to post-harvest loss [3] • **Own consumption:** 97.5% is consumed by farmer [3] • **Price tuber:** Cassava sells for 15.000 NGN/MT [3] • **Price volatility:** High [3] • **Income from crop:** 85% of total income [3] • **Income from other crops:** 14% of total income [3] • **Income from non-agri activities:** 1% of total income [3] • **Living income benchmark:** 1,651 USD/HH/year • **Poverty line:** poverty line is 912 USD/HH/year • **Household size:** 5 people [4]	• **Per capita food production variability:** 11.5 thousand $ per capita [6] • **Global production**: Nigeria is global leader in production of cassava tubers • **Export vs Import:** Less than 1% of cassava is exported. To address local industrial demand, Nigeria imports on average 90% of all cassava derivatives. • **Local market:** 90% of processed cassava is sold in local markets, only 10% used for industry	• **District level nutrition status:** Malnutrition is prevalent, mostly for children [4] • **National average dietary energy supply adequacy:** 116% in 2016-2018. Combined with the prevalence of malnutrition indicates bad distribution of food supply in the region [6] • **Access to clean water:** Yes [4] • **Access to sanitation:** No [4]

Sources: 1) CAVA, Cassava: Adding Value for Africa (2013). 2) Dalberg (2015). 3) CrestAgro and Psaltry SDM analysis (2018). 4) DHS Nigeria (2018). 5) LSMS Integrated Surveys on Agriculture Nigeria (2019). 6) FAOSTAT (2020)

Assessment of Climate Resilience-related risks and opportunities

Although cassava is a climate resilient crop and grows on erosion-prone and infertile soils, increased frequency of droughts will test the resilience of cassava farmers and show the need for irrigation.

Farmer sensitivity and exposure to	Exposure	Sensitivity	Detailed description of risk	Expected impact
Changing temperatures	**High risk**	**High**	• The more extreme temperature will lead to more droughts and wildfires in the region[1,6]	• Water stress due to droughts will affect yield • Increased wildfires could damage the block farm and facilities
Changing rainfall patterns and soil conditions	**High risk**	**Average**	• Water risk due to droughts in the region are high[2] • Soil erosion is a general problem in Nigeria and leads to low soil fertility. Cassava contributes greatly to soil erosion[2]	• Water stress in the first three months after planting decreases tuber growth and yield • Low soil fertility causes yields to decrease
Frequent climate extremes	**High risk**	**High**	• Droughts in the region will become more frequent[1,6]	• Water stress due to droughts will affect yield

Farmer adaptive capacity			
Category	**Cash-flow**	**Assets**	**Access to services**
Adaptive capacity	**Unable to assess**	**Average risk**	**High risk – needs attention**
Data	**No farm-level data available**	• **Ownership:** 76% of rural households own land[4] • **Farm size:** an average smallholder farm size is between 0.5-2ha [3] • **Cassava farm size:** 0.5-2 ha (~100% of total farm) • **Other crops:** Most farmers grow diversified crops, mainly maize, watermelon and cowpeas [3] • **Animals:** 65% of the farmers own livestock[4]	• **Phone**: Most farmers own a phone (85 percent)[4] • **Bank account:** 40% has a bank account[4] • **Mobile money account:** Only 30% of farmers uses their phones for financial transactions [4] • **Loan:** Most farmers have no access to affordable loans, limiting farmers to adopt improved practices [4]

Sources: 1) Geofolio (2020). 2) Aqueduct Water Risk and Glasod (2020). 3) CrestAgro and Psaltry SDM analysis (2018). 4) DHS Nigeria (2018). 5) LSMS Integrated Surveys on Agriculture Nigeria (2019). 6) Think Hazard (2020)

2. STRATEGY

Understanding the SDM's strategy and business model

ABAAS seeks to become a prime cassava processor capturing 5% market share of cassava derivatives by 2025

Goals & Aspirations

- Production target of 7,500 MT/year of HQCF reached within the next year (37,500 MT tubers)
- Capture 5% market share within 5 years
- 90% of supply comes from own cassava tubers production
- Obtain average yields of at least 15 MT/ha, preferably 20 MT/ha
- Source from 4,000 farmers by year 2025
- Increase farmer net incomes with 50% by year 2025

Where to Play*

High priority

- Offer effective and affordable service package (training, stems, inputs, mechanization) to improve block farm yields and farmer incomes
- Pilot, prove and promote service offering to quickly attract large block farmer base in Ekiti State
- Reach out and attract domestic buyers

Low priority

- Develop sourcing and service relationships with community farmers

How to Win**

Points of Differentiation

- Realize above industry-average processing plant capacity utilization rates
- Guarantee high grade cassava production to serve domestic buyers
- Minimize post-harvest losses
- Maximize efficiency through end-to-end control of vertically integrated cassava production

Points of parity

- Organically grow business to minimize external financing cost
- Leverage revenues from other business units to grow the cassava unit with more processing lines and a stem multiplication farm

Capabilities Required

Critical capabilities

- End-to-end cassava production, processing, planning and logistics
- Agribusiness investment and finance understanding, networking and deal making
- Cassava derivates domestic marketing and sales
- Cassava (and complementary crops) agro-economic expertise and knowledge dissemination
- Farm Services management and support: marketing, farmer satisfaction, contracting, financing

Supporting capabilities

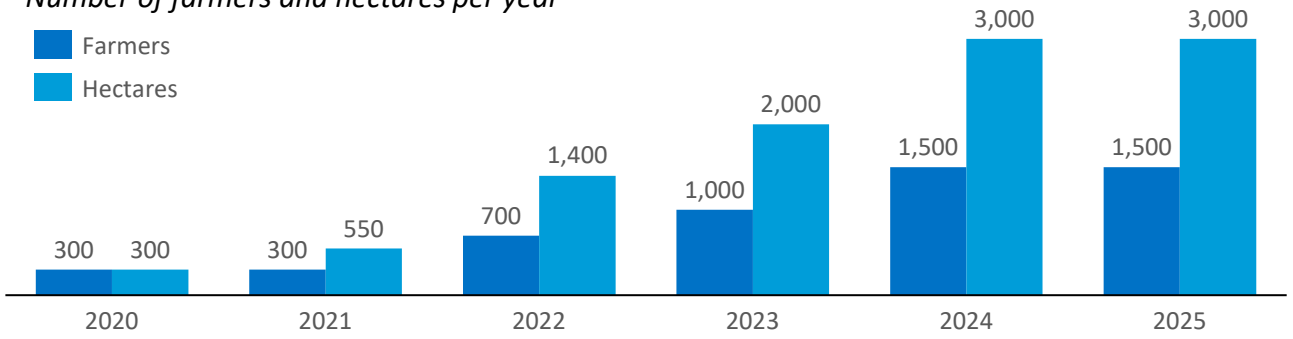
- Input provider relationship management

**Where to play* describes geographies; product and service categories; customer segments; customer channels the SDM should focus on to achieve its targets.
*** How to win* lists key choices related to price, product differentiation, specialization, etc.

Located in Ekiti state, ABAAS prioritizes gradual development of its block farm model over community farmer engagement

Scale of ABAAS block farm

Number of farmers and hectares per year



Startup

- ABAAS leases 1,500 hectares of land to be dedicated to their block farm operations
- ABAAS is currently in the process of clearing all the land of the block farm and recruiting block farmers
- Farmers are on average assigned to 1 hectare plots to be increased to 2 hectares from 2020 onwards
- ABAAS is in the construction phase of the processing factory

Gradual scale up

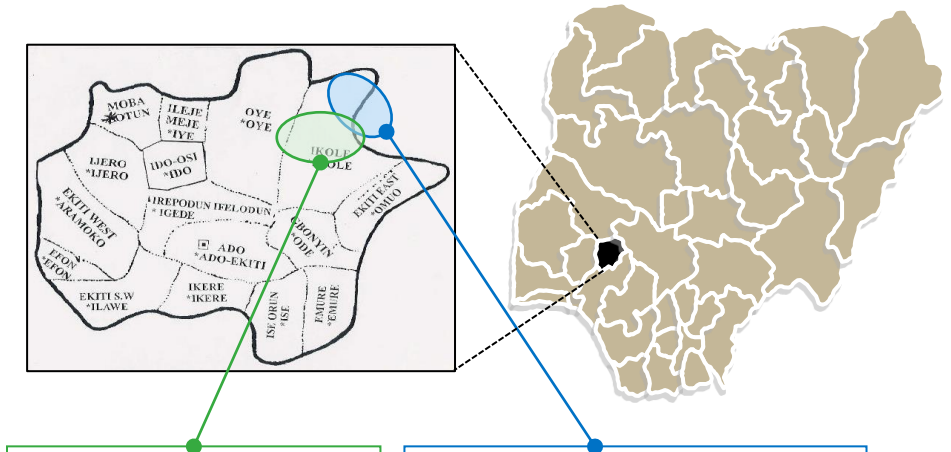
- ABAAS plans to gradually increase the number of block farmers on their land to ensure meeting 90% of capacity of the processing facility (requiring 30,000 MT tubers per year).
- A gradual and organic growth trajectory allows ABAAS to minimize external dependency and financing costs

On-going production

- ABAAS will strengthen relationships with existing block farmers and optimize tuber production and processing efficiency
- Increased efforts are put into sourcing from community farmers.

Location of operations

ABAAS is located in Ekiti state. One of Nigeria's key agricultural states with a positive future outlook for agriculture. Apart from its block farm there is potential to expand service and sourcing operations to established cassava farmers in the region



1,500 ha scattered block farm with processing factory, nucleus farm and target of around 1,500 farmers by 2022.

Scattered community farmers, no service relationship yet. Start of outreach, training and sourcing relationship expected in year 2020.

Sources: **1)** ABAAS business plan (2019), 2) https://yourfreetemplates.com/africa/

Costs of farm services are to be recouped through margins on core activities: mechanization, aggregation and processing

Overhead (management, HR, legal, utilities, etc.)

Sourcing, processing & sales

Collection & Transport
- ABAAS uses their own tractors and truck collect and transport produce from the block farms and community farmers to the production facility.
- ABAAS covers the cost of transport.

At cost

Quality control & HQCF processing
- Starch content is checked by ABAAS through sample testing upon arrival of the produce at the factory.
- ABAAS owns and operates an HQCF processing factory.

Sales and logistics
- ABAAS aggregates the produce and sells to domestic buyers.
- ABAAS manages the logistics of the HQCF to the offtaker at own cost.

Farm services

Access to finance
- ABAAS provides the farmers with access to finance by taking out a loan for ABAAS and distributing it amongst the farmers as a credit. This credit is used for planting material (stems), agro-inputs (fertilizer and herbicide), collection and transport, and mechanization services.
- ABAAS reclaims the credit from sales of cassava tubers.

At cost

Training and Extension services
- ABAAS trains their own and Government Extension Officers to train the lead farmers, who in turn train block and community farmers.
- ABAAS provides training on GAP and bookkeeping.

No charge

Planting material
- ABAAS supports all farmers to access cassava stems.
- ABAAS currently purchases the stems from a local stem multiplier. From 2020, ABAAS will multiply its own high-quality stems.
- Block farmers receive the planting material on credit from ABAAS.

At cost

Inputs
- ABAAS supports block farmers to access high-quality agro-inputs.
- The input bundle includes high-quality fertilizer and herbicides and the volume is based on economy of production.
- Block farmers receive the inputs on credit from ABAAS.

At cost

Mechanization
- ABAAS provides mechanization services including tractors for land preparation, ploughing, harrowing and weeding, a boomer sprayer, and a planter to block farmers.
- Block farmers receive these services on credit from ABAAS.

At cost

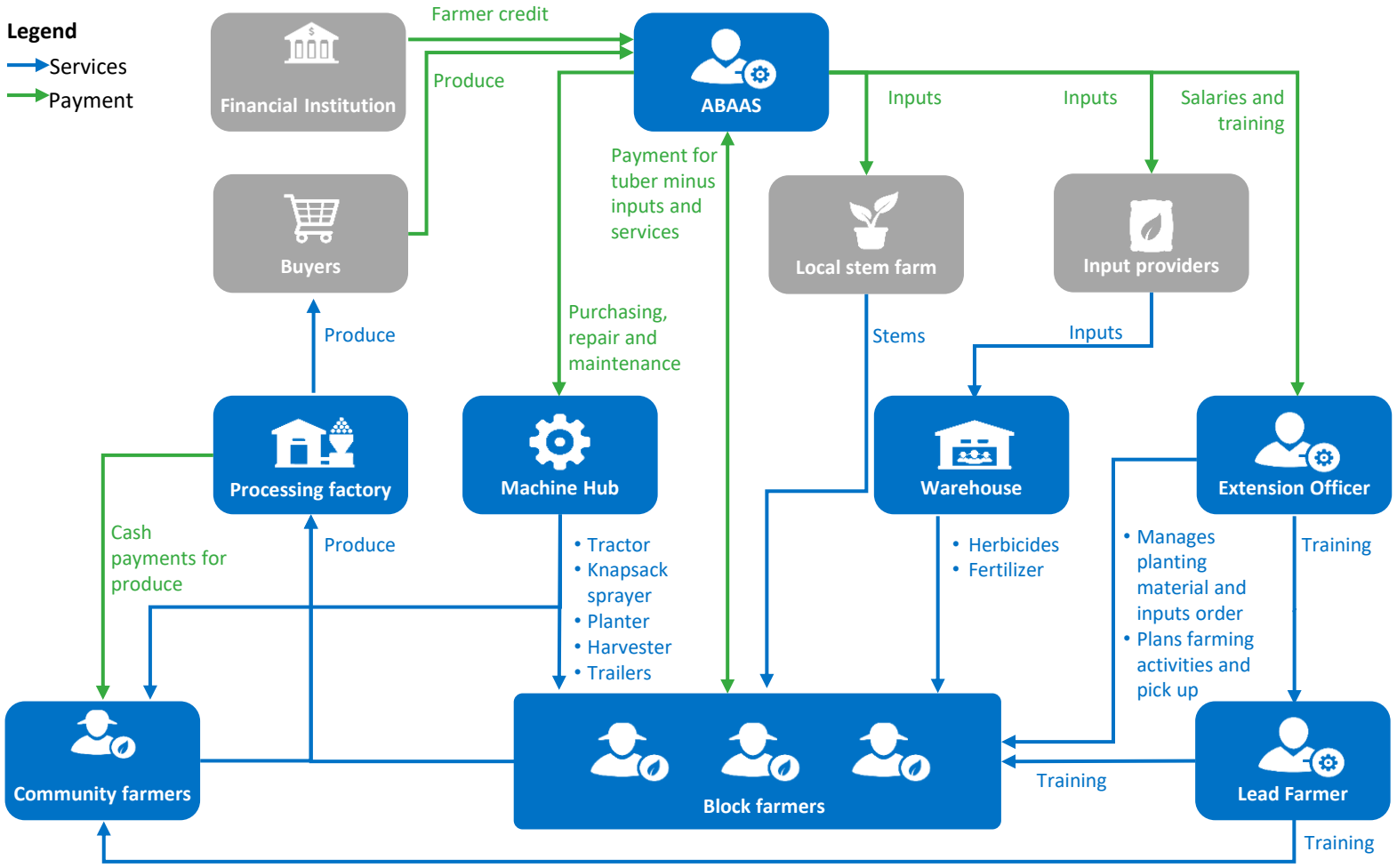
Margin

Note: Box indicates revenue model per farmer service. No charge: ABAAS charges no fee for providing this service. At cost: ABAAS transfers the exact cost for hiring this service to the farmer. Mark up: ABAAS charges an additional margin on top of the cost for hiring this service.

Overview of partners with active contribution to SDM operations

Actor	Legal Status (country)	Function (within this SDM)	Revenue model (within this SDM)	Incentive to participate (within this SDM)
Input providers	Private limited companies (NGA)	• Sells herbicides and fertilizers to ABAAS • Delivers inputs to ABAAS storage in Lagos	• Margin on product sales	• Increased sales volumes
Ministry of Agriculture	Public institution (NGA)	• Provides extension services	• None	• Improvement of cassava value chain in Nigeria • Training of farmers in Nigeria
Banks	Private limited companies (NGA)	• Provides ABAAS with loans (in future)	• Interest on loans (in future)	• Increase sales volumes
Insurance companies	Private limited companies	• Provides farmers with insurances (in future)	• Insurance premiums (in future)	• Increase sales volumes
IDH	Non-profit organization (NLD)	• Provides technical and financial support	• None	• Improvement of cassava value chain in Nigeria
Investors	Private limited companies (tbd)	• Provides financial support	• Return on investment	• Improvement of cassava value chain in Nigeria
ABAAS Limited	Private limited company (NGA)	• Provides startup capital • Provides human resources and expertise	• Cost savings • Sales of other vegetables grown on ABAAS farms • Sales of mechanization services	• Cost-sharing of overheads • Increasing efficiency and leveraging synergies of integrated agribusiness

Key channels



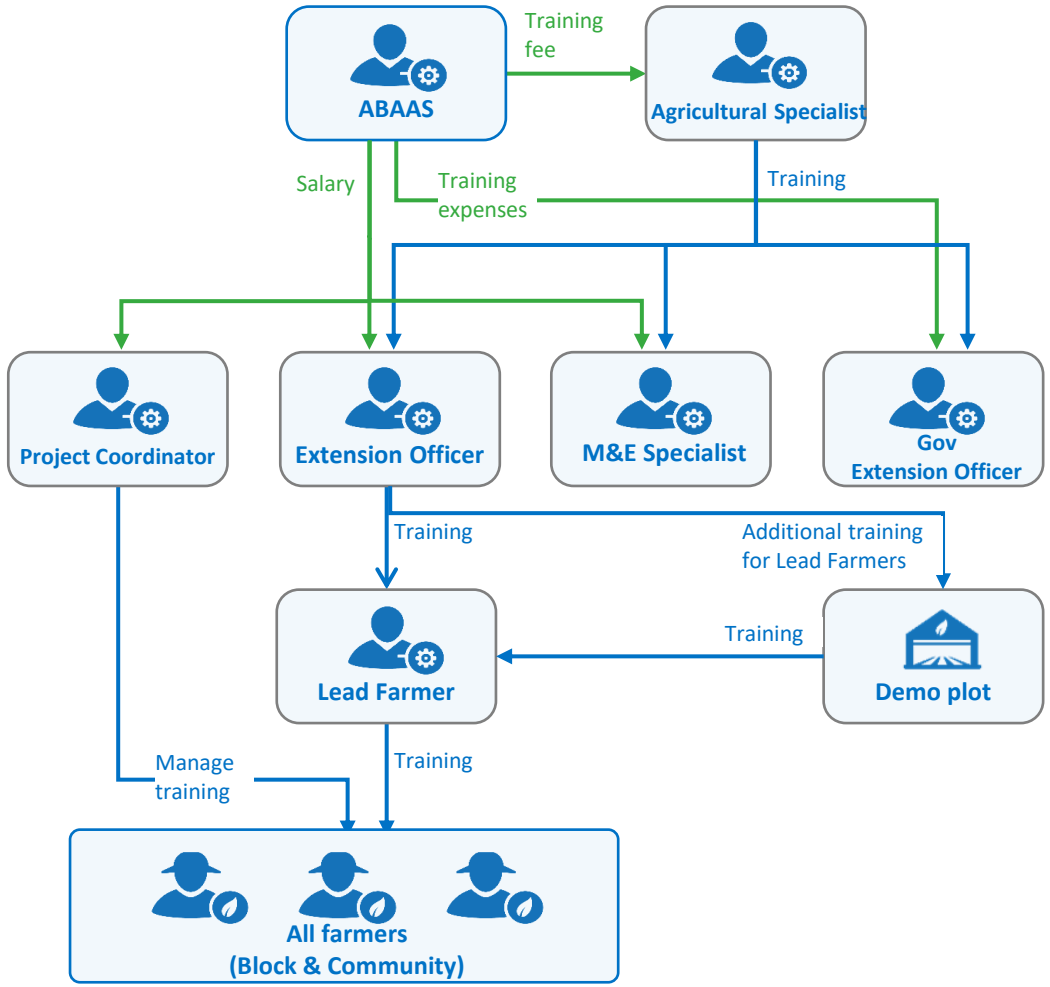
Service delivery channels

- ABAAS provides locally produced stems as input for farmers on credit
- ABAAS provides mechanization services, agro-inputs and transport to the farmers on credit
- ABAAS collects the tubers at the block and community farms
- The FI provides credit to ABAAS, who in turn uses the credit to provide all services to the farmers
- Extension Officers train famers, manage the distribution of inputs to farmers, ensure GAP are well applied and arrange the harvest and pick-up of harvested tubers
- ABAAS manages the processing facility and the transport of processed HQCF to the offtaker

Main challenges in service delivery

- Timely delivery of harvested tubers to the processing facility
- However, they will open a multiplication farm in 2020.
- Access to credit from the FI

Detailed overview of training



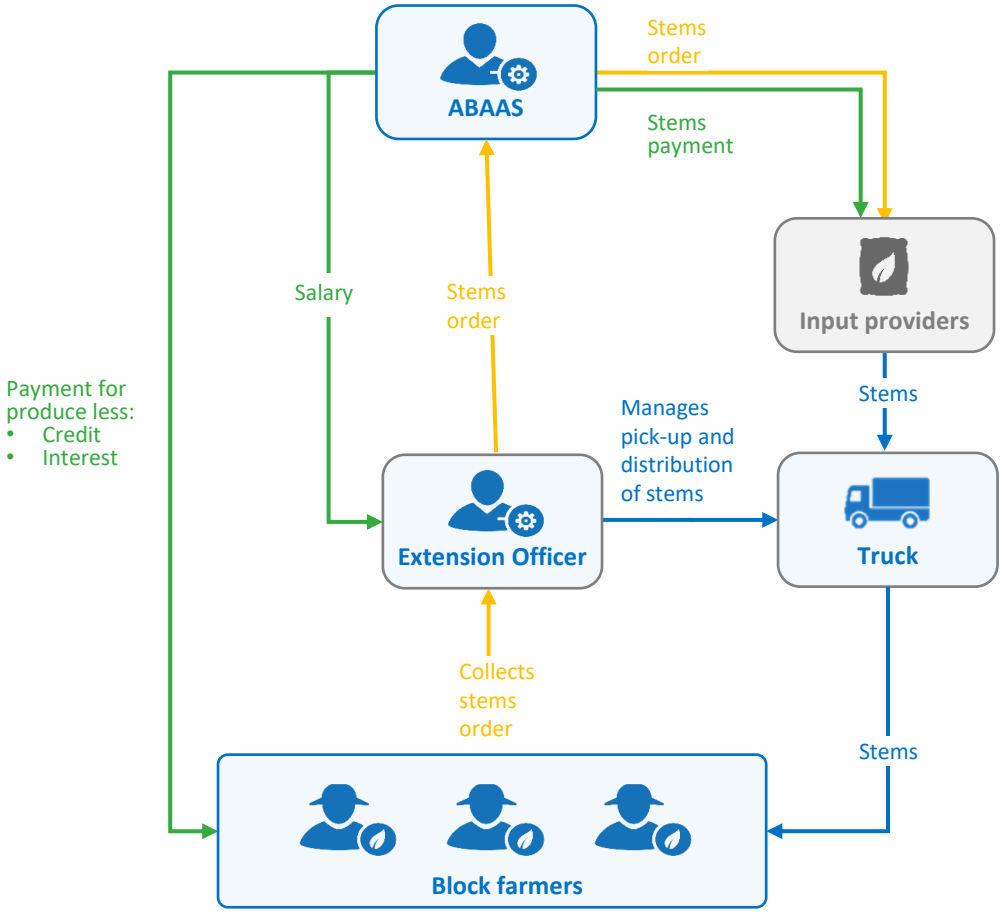
Legend

- Services
- Payment
- Information flows

Description / Methodology

- ABAAS provides training at three levels: 1) training of trainers (ABAAS Extension Officers, Project Coordinators, Government Extension Officers and M&E Specialist) 2) training of lead farmers, and 3) training of out-growers and community farmers.
- Training of trainers is performed once per year by an external Agricultural Specialist.
- The Lead Farmers are trained by the Project Coordinators and ABAAS Extension Officers.
- Farmers are trained on best practices of cassava cultivation, including farm management, land preparation, planting and harvesting. Additionally they are also trained on bookkeeping. Extension Officers and Project Coordinators provide an additional training to Lead Farmers on a demo plot owned by ABAAS.
- Future: Demo plots will be set up by ABAAS in various communities to provide in-field training and showcase GAP (good agricultural practices).

Detailed overview of planting material (stems)



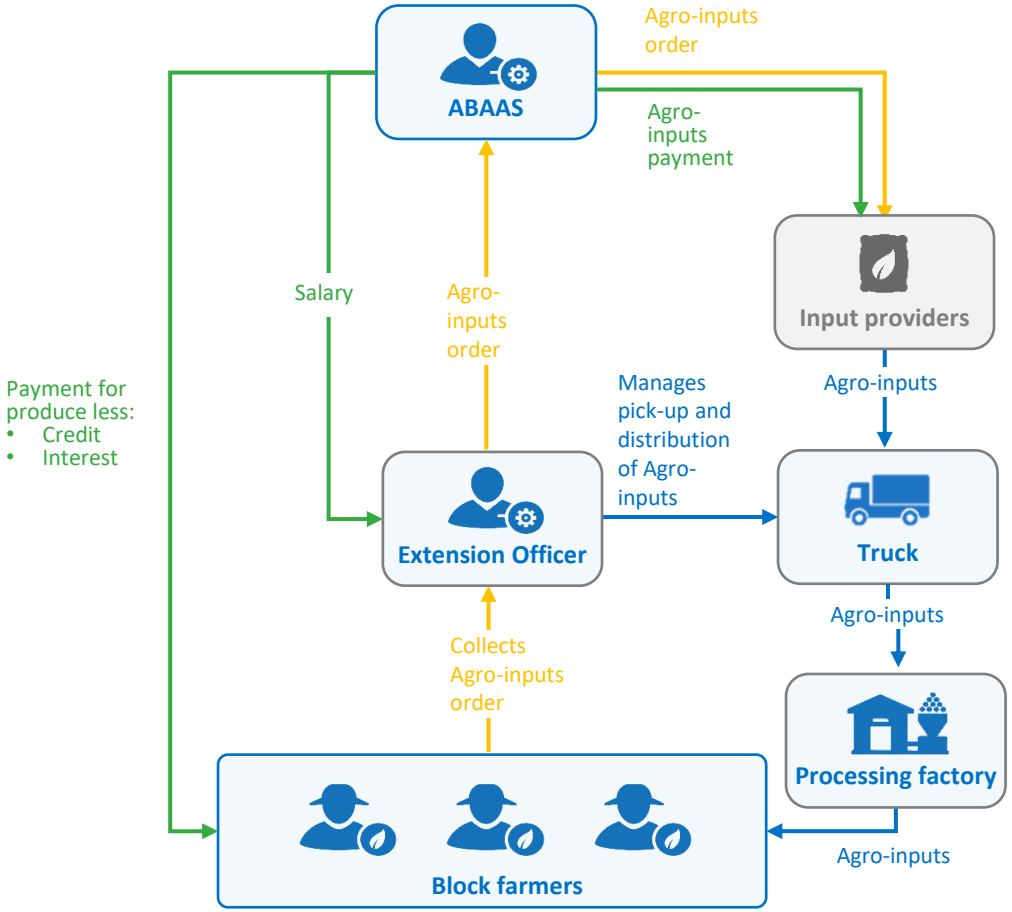
Legend

- Services
- Payment
- Information flows

Description / Methodology

- ABAAS purchases stems from local stem multipliers and provides it to the block farmers at cost to farmers.
- ABAAS extension Officer manages the collection and distribution of the stems to the block farmers. ABAAS uses its own truck for the distribution.
- The FI extends a credit to ABAAS who in turn uses the credit to cover the payments for the stems they provide.
- Block farmers sell their cassava harvest to ABAAS, who deposit the corresponding amount to the farmers' individual bank accounts. The bank deducts the credit for the stems and interest from that amount.
- Community farmers buy the stems from open market, but ABAAS provides them with guidance on finding the right suppliers and quality.
- Future: ABAAS plans to create its own stem multiplication farm of 400ha next year.

Detailed overview of input provision



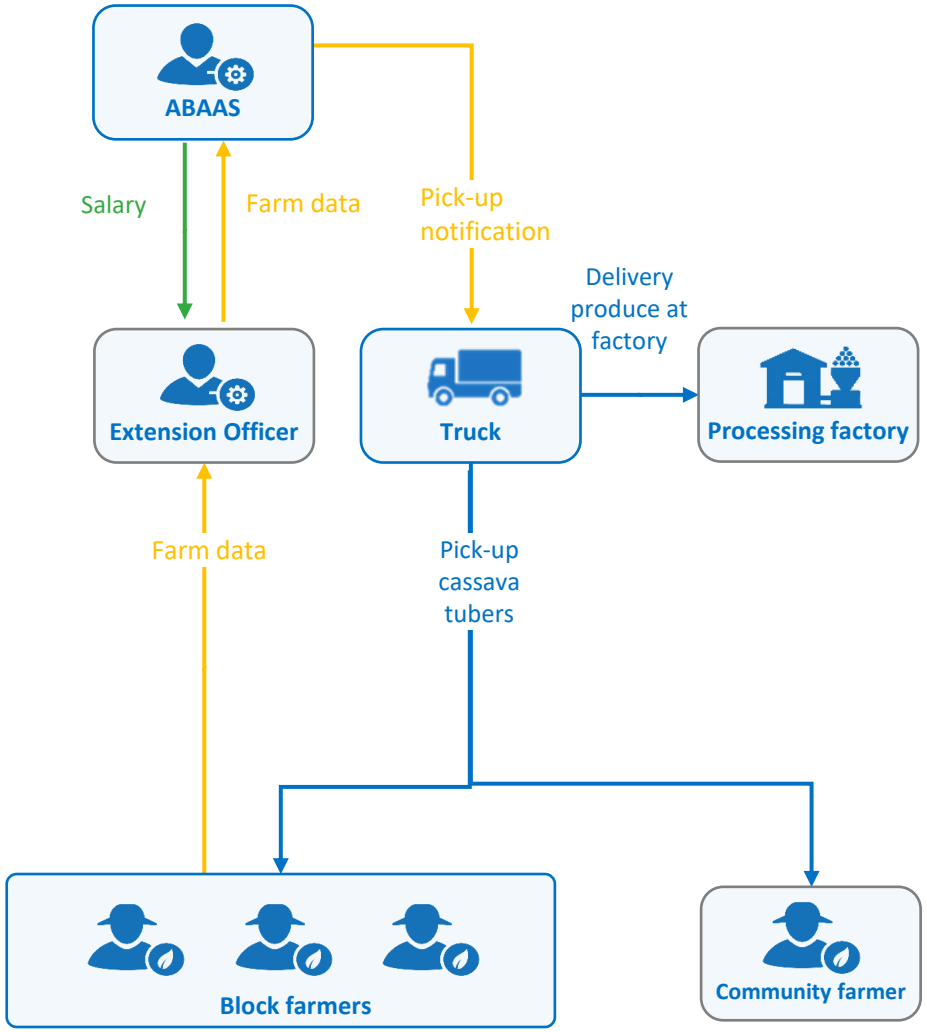
Legend

- Services
- Payment
- Information flows

Description / Methodology

- ABAAS provides agro-inputs, more specifically fertilizer and herbicides, to block farmers on a cost recovery basis.
- ABAAS extension officers consult with the block farmers to establish the fertilizer and herbicide needs for their farms.
- ABAAS collects all the agro-inputs needs of the farmers and orders them in bulk with an Input Provider (IP)
- ABAAS negotiates with the IP on the price of agro-inputs per farmer.
- The ABAAS Extension Officers coordinate the transport of the agro-inputs to the factory and the distribution among the block farmers.
- The FI extends a credit to ABAAS who in turn uses the credit to cover the payments for the agro-inputs they provide.
- Block farmers sell their cassava harvest to ABAAS, who deposit the corresponding amount to the farmers' individual bank accounts. The bank deducts the credit for the agro-inputs and interest from that amount.
- *Future:* ABAAS plans to provide agro-inputs to the community farmers in the future.

Detailed overview of collection and transport



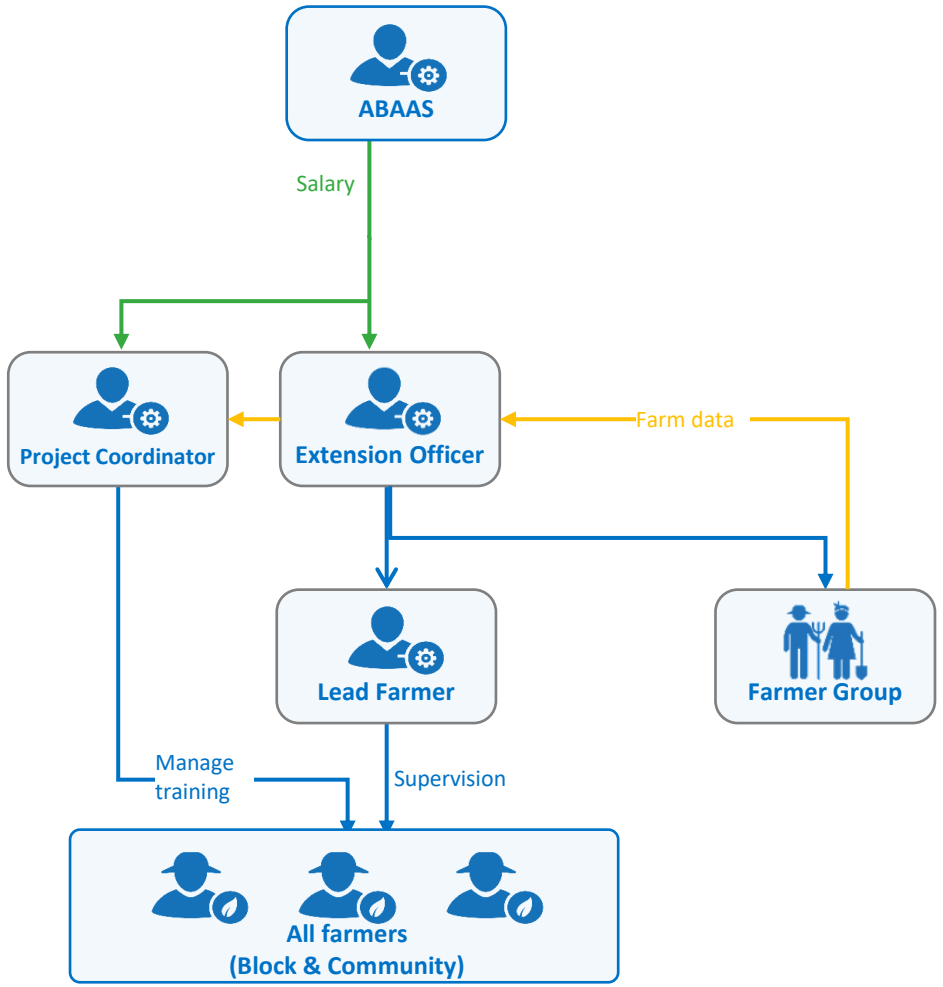
Legend

- Services
- Payment
- Information flows

Description / Methodology

- ABAAS uses their own truck to transport produce from the farms to the ABAAS processing factory.
- ABAAS's Extension Officers are informed on the timing of the key farming activities through their visits at the Farmer Groups and block farms, this allows them to inform ABAAS when and where the truck needs to pick up produce from both block farmer and community farmer.
- ABAAS performs a visual quality check at the farm and a starch content verification at the processing factory.
- The cost of transport is charged to the farmers when ABAAS pays them for the sales of tubers.
- *Future:* ABAAS plans to hire more trucks in the future in line with the increase in cassava production.

Detailed overview of extension services



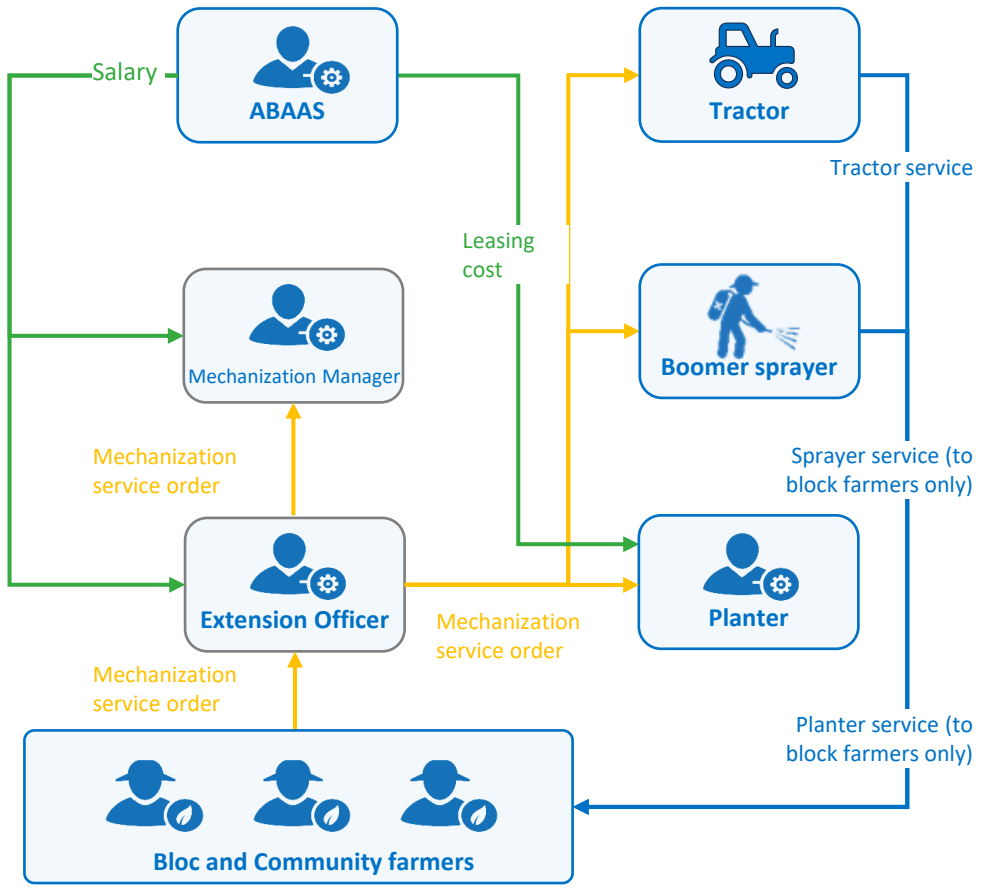
Legend

- Services
- Payment
- Information flows

Description / Methodology

- ABAAS Extension Officers supervise block farmers at each key stage of cultivation (planting, input application and harvest) to ensure GAP are applied, the farmers plant the right stems and apply of the correct quantities of inputs.
- ABAAS Extension Officers visit farmers groups – who meet regularly- to stay informed on the start and duration of the planting and harvesting cycle.
- ABAAS's Project Coordinator aligns with the Extension Officer to ensure the farmer training is given correctly and at the right time during the season.
- ABAAS Extension Officers will visit all block farmers minimum one time during the season. However, community farmers are only sporadically visited for monitoring throughout the season.

Detailed overview of mechanization



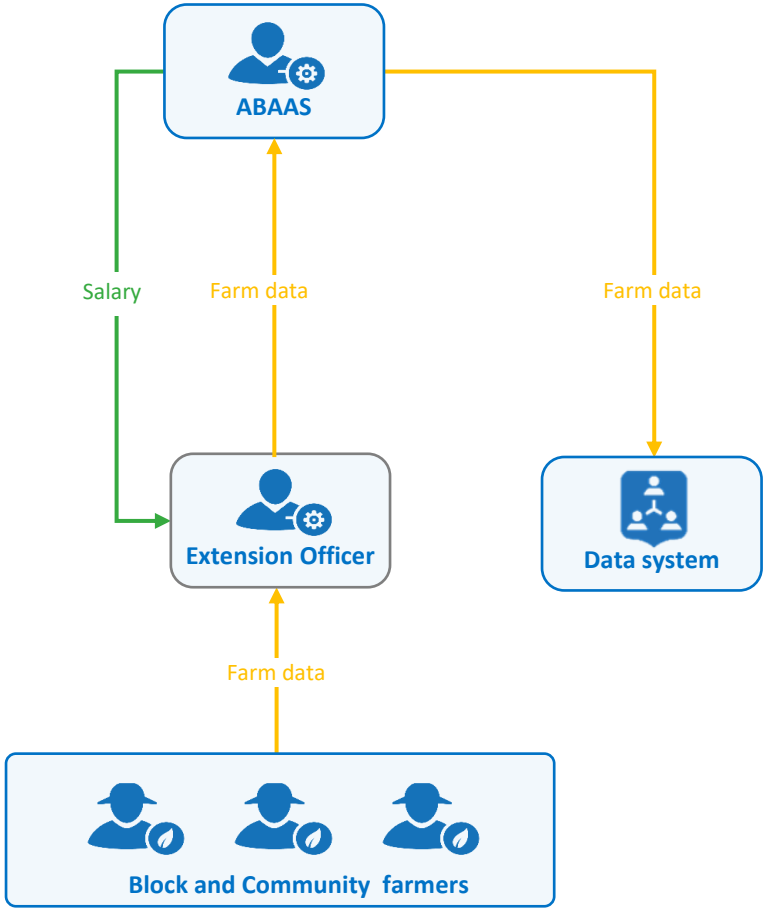
Legend

- Services
- Payment
- Information flows

Description / Methodology

- ABAAS provides mechanization services for the block farmers consisting of tractor services for land preparation, boomer sprayer services for herbicide application and mechanized planter services. Community farmers can only hire the tractor service.
- ABAAS owns both the tractors and boomer sprayer and hires the mechanized planter and operator.
- These services are offered on credit by ABAAS to block and community farmers, but ABAAS charges a market rate for them.
- Both block and community farmers sell their cassava harvest to ABAAS, who deducts the credit for the mechanized services and interest from the revenues of sales.
- ABAAS's Extension Officer plans the timing of the mechanized services and the Mechanization Manager manages the organization.
- Future: ABAAS plans to purchase their own mechanized planters and hire operators instead of providing the access to hire the planter service to farmers.

Detailed overview of technology



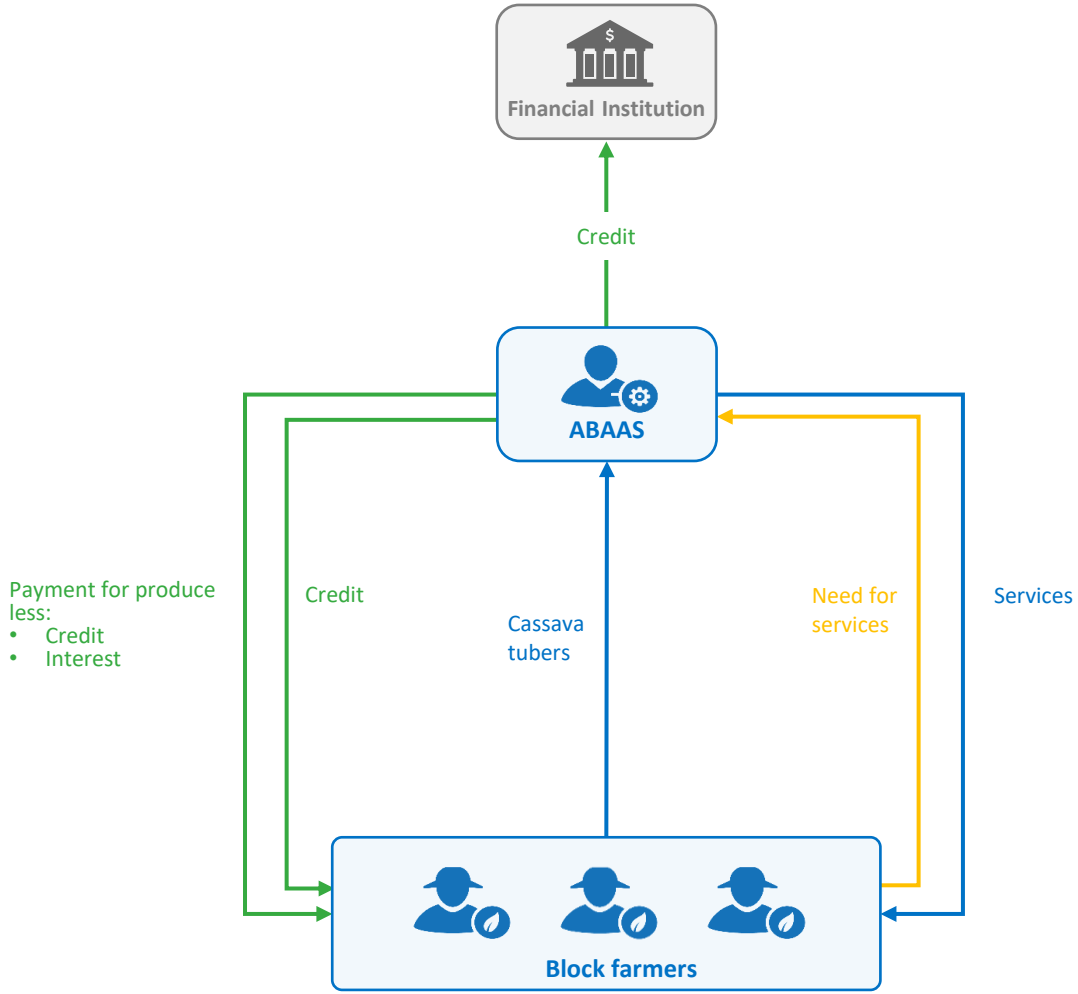
Legend

- Services
- Payment
- Information flows

Description / Methodology

- ABAAS is developing a data information and management system which contains all relevant farmer data, e.g. name, age, telephone number, geo location, farm size, ...
- ABAAS Extension Officers collect the farmer data during farmer registration.
- ABAAS will use this information in support for harvest planning and supply forecasting.

Detailed overview of access to finance



Legend

- Services
- Payment
- Information flows

Description / Methodology

- *Future*: The FI extends a credit to ABAAS, who in turn will provide access to finance to the block farmers to cover the payments for the services they receive.
- The interest rate charged to ABAAS and consequentially to the block farmers is 21%.
- The block farmers provide a cross guarantee within the Farmer Group to ensure ABAAS has no issues with defaults from block farmers.
- Block farmers sell their cassava harvest to ABAAS, who deposit the corresponding amount less the credit to the farmers' individual bank accounts.
- Community farmers cannot use this service.

Farmer segments

ABAAS is developing a dedicated supply chain to meet its HQCF 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. ABAAS will also give training to 2,500 community farmers (without sourcing commitments) as part of the SDM.

	Baseline	Block farmer	Community farmer
Description	• No relationship with ABAAS	• Signed contract with ABAAS • Farm is located on block farm land rented by ABAAS	• MoU with ABAAS • Farm is located around the block farm of ABAAS and owned by farmer
Key characteristics	• Farm 1.25 ha • Yield 9.5 MT/ha • Minimal input use • Intercropping with maize, cowpea and yams	• Farm 1 ha, but will become 2 ha standard from 2020 onwards. Gradual increase to 5 ha for well-performing farmers • Yield 15 MT/ha with increase to 20 Mt/ha within two years due to GAP • Optimized input use • No intercropping • 100% loyalty – no sideselling	• Farm 2 ha • Yield 11 MT/ha with increase to 15 Mt/ha within three years due to GAP • Minimal input use • Intercropping with maize, cowpea and yams • 65% loyalty – side selling is common
Services	• No service relationship	• Training • Extension service • Planting material • Inputs • Mechanization • Transport • Access to finance	• Training • Extension services • Mechanization • Transport

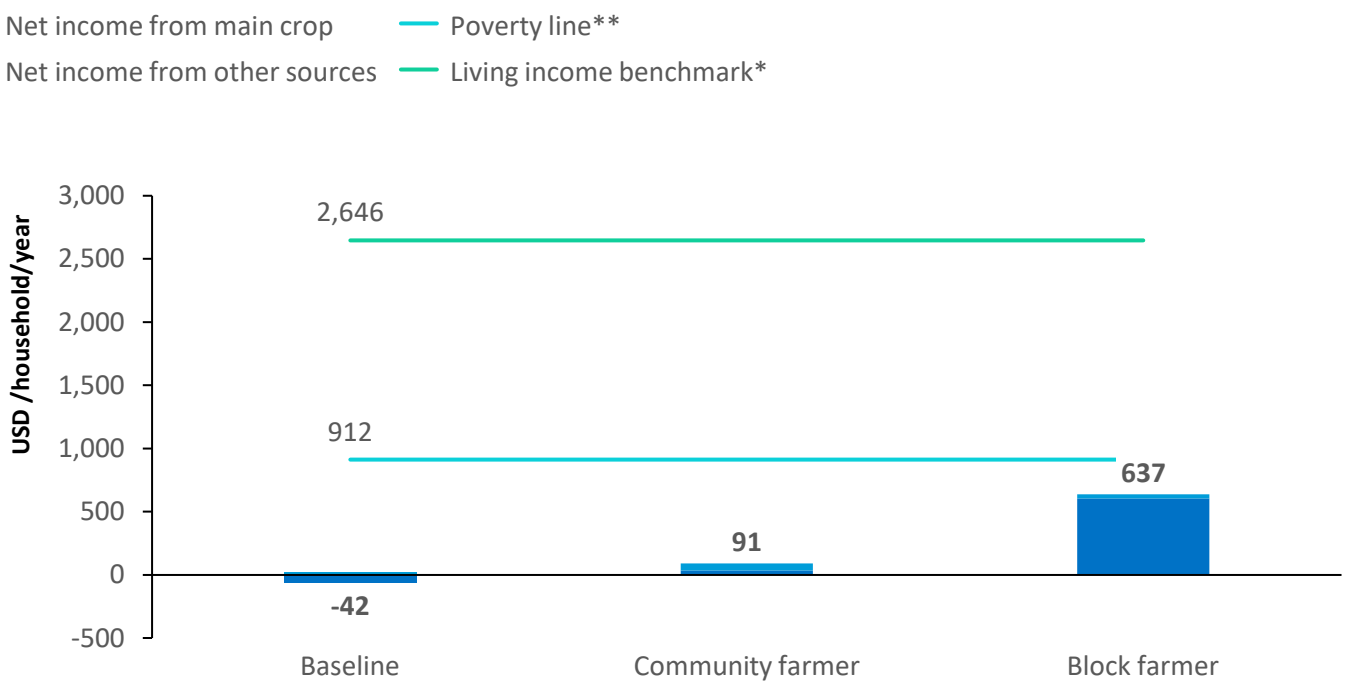
A block farming model best addresses tuber sourcing challenges

	Block farm *Land leased by farmer*	Organized outgrowers	Unorganized outgrowers	Open market
Commercial viability	+ Low cost/MT + High productivity potential + Control of planting, constant supply − High investment − High initial costs of land clearing	+ Low market price + High volume potential − Risk of side-selling − High risk of defaulted loans	+ High volume potential + Low engagement costs − Low cost/MT − Little control of production and side-selling	+ Ample supply − Very volatile prices − High and unpredictable cost of sourcing
Local impact	+ Provides women with equal opportunities − Limited to employment generation	+ Medium impact on livelihoods through comprehensive support	− Low impact potential due to short-term plans of sourcing (and offering support)	− Limited to increase in demand
Risks and vulnerabilities	− No risk-sharing with farmers	− ROI dependent on farmer loyalty − Risk of high costs from loan defaults	− ROI dependent on farmer loyalty	− Vulnerable to market price increases and competition
Feasibility	+ ABAAS owns 5,000 and leases ha land − Limited by capital investments	+ Plenty nearby farmers − Inexperience with service provision	+ Plenty nearby farmers	
Priority of sourcing	HIGH	MEDIUM	MEDIUM	LOW

Farmer livelihoods

Comparing household income, living income benchmark and poverty line in year 5

Shown for each farmer segment, in USD/household/year



Land size per household (ha)	**1.25**	**2.00**	**4.00**

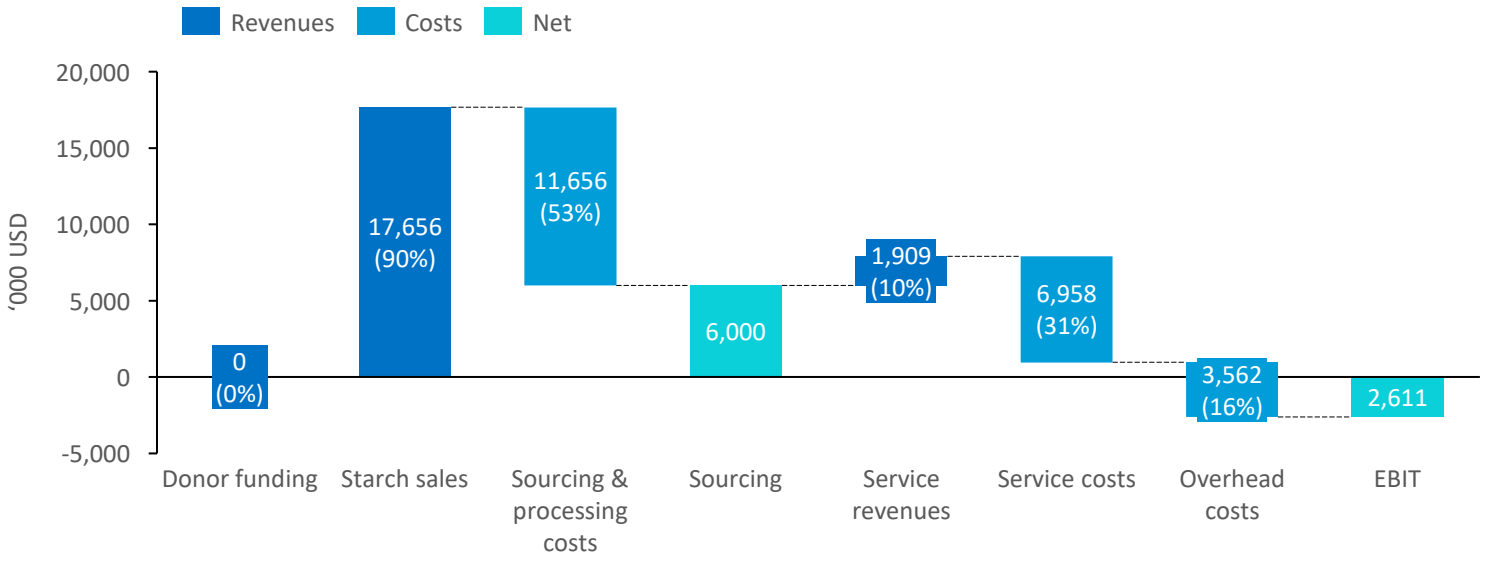
Impact on farmer incomes

- Given that a baseline farmer uses 75% of their total cassava production for own consumption, their net income from cultivating cassava is negative.
- Community farmers' net income is similarly low although positive due to lower PH losses and . The baseline and community farmers' largest expenses are hired labor for weeding and harvesting, and their sporadic purchase of low-quality but expensive fertilizer.
- If ABAAS' envisioned service impacts will materialize, the SDM significantly boosts farmer incomes from cassava cultivation from **negative $42 to $637 in 5 years**. Key income drivers are discussed under the impact of services on farmer profitability and credit on farmer cash-flow.
- The access to a plot of land on the block farm provides farmers with an additional revenue stream that will enable their households to **earn 66% of the Worldbank poverty line of $912 per household per year.**
- **Increasing the block farmers plot size from 2 to 5 hectare** will significantly increase their per household income to $1,692 per year.

ABAAS profit and loss by activity

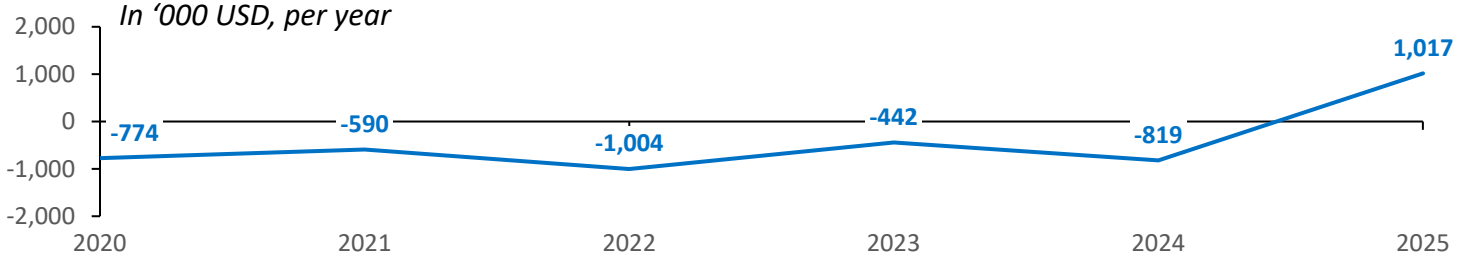
SDM profitability

Profit and loss in '000 USD, total 2019-25



Annual net income

In '000 USD, per year



Financial sustainability

- Net income remains negative until 2025 as large investments are made in the scaling up of the nucleus farm, the block farm and in the number of farmers sourcing from. Although ABAAS has large costs related to sourcing, these expenses are clearly outweighed by the revenues made from selling processed HQCF making this a profitable business from 2025 onwards and cumulating to an annual net profit of around $1.0 million from 2025 onward.
- The main revenues are from selling processed HQCF, stems and mechanized services, representing respectively 90%, 3% and 7% of total revenues.
- The largest expense for ABAAS comes from sourcing the high-quality tubers from block farmers and community farmers and operations of the processing factory (combined 53% of total expenses).
- The second largest expenses come from the set-up and operation of the nucleus farm (captured in the service costs at 29%), followed by the land clearing of the block farm (9%).

4. ASSUMPTIONS

Sources

Source	Link (if publicly available)
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