Developing Inclusive Grain Supply Chains in Northern Nigeria

SDM analysis report

Adefunke Desh

July 2022

Swiss Confederation
Federal Departement of Economic Affairs, Education and Research EAER
State Secretariat for Economic Affairs SECO

Ministry of Foreign Affairs

DANIDA

ADEFUNKE DESH NIG. LTD

Nestlé Good food, Good life

idh the sustainable trade initiative

Executive Summary

Introducing Adefunke Desh' strategy and business model, business case and impact case

Strategy and business model

- Adefunke Desh aims to be a premium supplier of maize and provider of agro-inputs, growing their sourcing volumes by c.205% between 2021 and 2026 and farmer numbers from 2,250 to 3,800 over the same period.
- They promise timely delivery of safe, high-quality pre-processed grains that meet buyers' needs, while providing farmers with fit-for-purpose service packages allowing them to invest in and expand their farms.
- 70% of produce is sold at a premium to food and beverage companies; 30% goes to animal feed producers. Nestlé is a key account, to which they supply the highest-quality grains that meet strict international food safety requirements (most importantly aflatoxin levels).
- As of 2021, Adefunke Desh employs Field Officers (24) and Extension Agents (17) that coordinate service provision between Lead Farmers (187), input providers and farmers. They rely on their own Sourcing staff (27), and Transporters and (150) and Women Sorters (70) not on the payroll for procurement and sorting. The field staff to farmer ratio is expected to go down from 833 to 531 by 2026.
- Farmers receive training, input pre-financing and equipment to overcome poor GAP, access to finance and PHHS.
- Recently Adefunke Desh has adopted a farmer graduation approach based on adoption of GAP and loan repayment history. As all farmers within a Self Help Group meet certain criteria their group is eligible for larger services packages.
- Key drivers of strong farmer relationships are on-going trainings, contracts, close field staff supervision, graduation incentives and premium prices.
- Being a woman-owned agribusiness, Adefunke Desh strives to be inclusive, focussing on, among other things, employing women in strategic positions.

Business case

- Adesh is currently not fully utilizing its installed capacity. The main constraints are limited access to affordable working capital and availability of high-quality grains.
- Regardless, Adefunke Desh is a profitable business with a Gross Margin of 15%; and Operating Margin of 7%. These are projected to increase to 15% and 8% respectively by 2026.
- EBIT is projected to grow at around 27% annually between 2022 and 2026 as the income per farmer increases over the same period.
- 55% of revenues comes from the sales of grains; the remainder from service provision by charging farmers 15% on inputs, 2% on loans and 15% on some of the equipment.
- Extending services to farmers remains profitable for Adefunke Desh.

Impact case

- By consistently applying the service package, an average farmer could increase yields from 2.0 to 4.2 MT per hectare while expanding their farms from 1 to 5 hectare over a period of five years.
- These improvements would significantly increase incomes from $300 to $1,600 per hectare or $8,100 per household.
- This income increase can only be unlocked through timely delivery of quality inputs on credit, as farmers need to overcome the $270 upfront investment to ensure quality and quantity of produce to cultivate 1 hectare of maize.
- Only from maize sales, farmers can earn 7% of the living income benchmark ($4,400 per household per year); increasing up to 88% after four years of good performance.

Executive Summary

Key recommendations to improve the business and impact case for Adefunke Desh

Business case

- **Secure working capital to increase operational efficiency:** Adefunke Desh should be supported in finding affordable and suitable loans to cover their input prefinance and maize sourcing working capital needs. A tripartite agreement between Nestlé, Adefunke Desh and the bank needs to be explored to unlock such financing. These loans are essential to increase sourcing volumes and in turn improving the processing facility's operating efficiency.
- **Invest in data systems:** it is recommended to invest in better farm management and traceability systems. Currently, farmers are not properly recorded. If farmers were to change Self Help Group, they are registered as a new farmer starting at level 1 of the graduation scheme. The only data available are farm sizes and yields, both in separate, difficult-to-match files. The current in-house developed Excel-based traceability tool is more prone to errors and less scalable than software solutions available.
- **Set social and ecological objectives:** aspiring to be a sustainable service provider and grain processer supplying international buyers, it is recommend to incorporate additional environmental and social impact objectives into their strategy. Examples are soil health metrics, a farmer income increase target, a target share of women workers, equal pay between men and women, all else equal.
- **Define business model for weather services:** the climate is changing, rains are becoming less predictable. Farmers needs timely weather information. Currently there is no clarity on how the aspired weather services from Ignitia are offered to farmers. No revenue or cost sharing mechanism is in place between service providers and farmers and the value is not yet communicated to nor proven with farmers.

Impact case

- **Revise impact assumptions:** the assumption that farmers are able to expand their farms from 1 to 5 hectares across the board is deemed unrealistic. Even now, with some farmers working with Adefunke Desh for some years, 98% of farmers owns less than 2 hectares. Adjusting this figure will impact farmer earning potential downward. Moreover, it is unclear what the current land use of those 4 additional hectares is. Will it come at the expense of High Conservation Value areas?
- **Reduce chemical fertilizer use:** expanding land under maize cultivation, increasing chemical fertilizer application rates and rising fertilizer prices pose a huge risk to the commercial and ecological sustainability of the business. Adefunke Desh could explore alternatives, such as precision fertilizer application methods, soil testing for accurate fertilize needs, local and/or organic fertilizers, and crop rotation schemes to reduce the amount of chemical fertilizers needs, its expenses and the resulting pollution.
- **See gender inclusion as a business opportunity:** Adefunke Desh could become more intentional in supporting female farmers. By collected sex-disaggregated data, and conducting focus groups with women, they could identify additional barriers in access to land, labor, inputs and decision-making power for female farmers. In turn, services tailored to women can be designed to help them overcome those barriers and unlock women productivity and earning-potential.
- **Strengthen the business case for sub-aggregators:** As part of their graduation approach, Adefunke Desh is encouraging smallholders to become sub-aggregators. However, the distinction between smallholders and sub-aggregators is unclear. The business case for farmers to become sub-aggregators is not proven either. The benefits should be researched and more clearly articulated.

Adefunke Desh | Business Case

Adefunke Desh business case | Strategy

Adefunke Desh's goal is to grow into a sustainable agro products provider whilst realizing strategic food security and achieving long-term growth into sustainable agriculture

Goals & aspirations

Commercial

- Achieve 25% annual growth in sourcing volumes by 2026.
- Produce at least 75% premium grains by 2022

Social & Environmental

- Contribute towards food security
- Protection of the environment and natural resources
- Integrate a total of 8,500 smallholders into grains supply chain by 2023
- Achieve 50% women inclusion into the supply chain by 2023

Where to play

- **Geography:** HQ located in Zaria, Kaduna state and with branches in Lagos, Ibadan and Kano.
- **Services:** Sourcing, milling, warehousing and supply of grains (maize, soybean and sorghum) for animal feeds and human food commodities
- **Markets:** Local and international markets focusing on the food and beverage industry
- **Sourcing channels:** Direct and indirect smallholder sourcing model

How to win

Points of parity

- Competitively priced high-quality products
- Professional sourcing and procurement services with constant delivery
- Strict compliance of operations to food quality standards

Points of differentiation

- Partnerships with government and commercial entities
- Strong and trustworthy stakeholder relationships
- In-house logistics fleet thus ensuring farm to fork quality of grains
- Direct farmer sourcing thus ability to offer better farm gate prices

Capabilities & Systems

Staff

- Procurement, warehousing, processing
- Marketing, sales and customer services
- Extension staff with agronomic and human behavioural background

Systems

- Supply chain management systems to facilitate traceability, quality assurance, logistics, ERP
- ESG strategy and policies

Adefunke Desh business case | Sustainable Business Model Canvas

Adefunke Desh aims to remain a preferred supplier of Nestlé through timely delivery of high-quality grains that meets the strict norms health requirements

Key partners

Sourcing
- Farmers
- Sub-aggregators
- Transporters
- Lead farmers

Other
- Local government
- Input providers
- Banks & insurers
- Weather advisory company
- Donors

Key activities
- Training
- Supply of inputs on credit
- Procurement of grains
- Warehousing
- Processing & Logistics

Key resources
- Factory equipment
- Sourcing & extension staff
- Women sorters
- Working capital
- ERP systems

Value proposition

To buyer:
- Timely delivery of safe, high-quality pre-processed grains that meet buyers' needs

To farmer:
- Provision of fit-for-purpose service package allowing farmers to invest and supply quality produce
- Premium price for high quality grains

Customer relationships
- Long term and close customer relationships with high quality grain buyers

Key channels

Buyers:
- Direct sales
- Export sales

Farmers:
- Field Staff, Lead farmers
- Extension Officers

Customer

Farm services
- Smallholder farmers

Processed grain
- Animal Feed processors (30%)
- Food and Beverage companies (70%)

Cost structure
- Infrastructure Capex
- Finance costs
- Staff
- General & admin

Revenue streams
- Margin on sale of grains
- Margin on sale of inputs

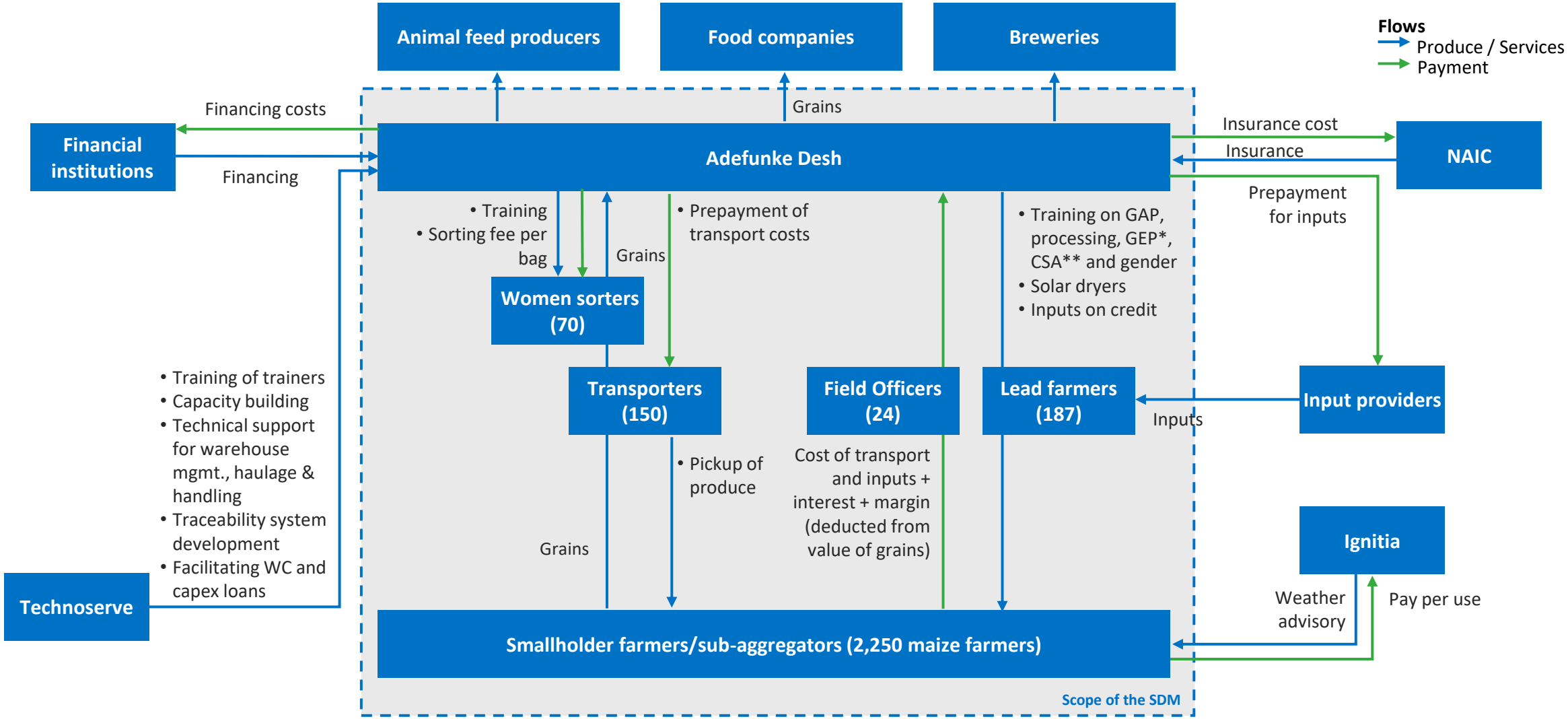
Kev Eco Social costs
- Air pollution from factory processing
- Chemical fertilizer use

Kev Eco Social benefits
- Household income increase
- Inclusion of women and youth
- Food security
- Sustainable agricultural practices

https://www.businessmodelsinc.com/about-bmi/tools/business-model-canvas/

Adefunke Desh business case | SDM structure

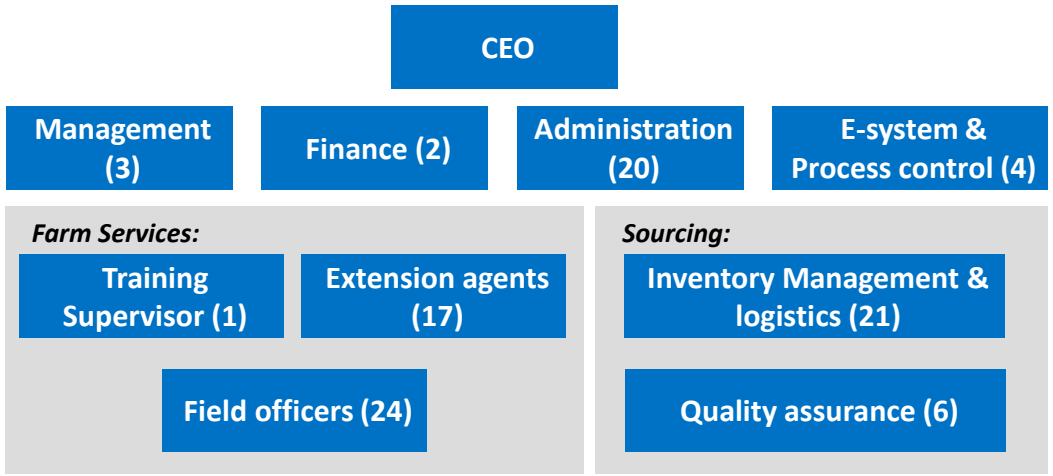
Adefunke Desh works with lead farmers and inputs providers for service provision and aggregation. Technoserve is building capacity of key staff to ensure effective provision of services to farmers.



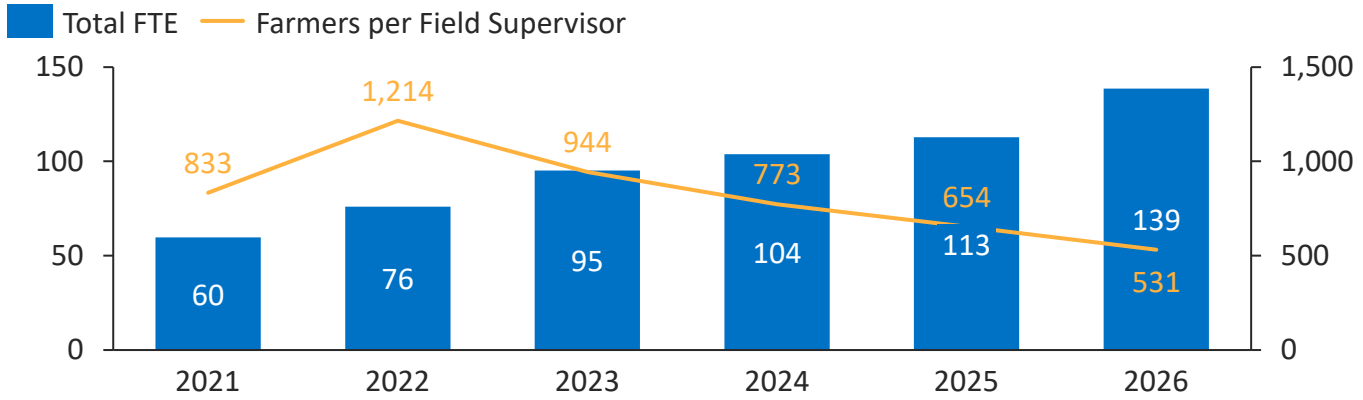
Adefunke Desh business case | Organizational structure

Majority of the staff employed are involved in the service delivery at farm level and facilitation aggregation of high-quality grains

Adefunke Desh organogram as of 2021



Total FTE and farmers per Field Supervisor over time



- Increase in FTEs is in line with projected business growth as Adefunke Desh continues to offer services on increasing hectarage
- Adefunke Desh projects to maintain operations in four LGAs: Kafur, Makarfi, Soba and Saminaka
- Input and collection centers will increase from the current 3 to 9 and 7 to 21, respectively by 2026
- Field operations will become more efficient as farmer to agent ratio is expected to go down to 531 by 2026
- Adefunke Desh is aiming to increase the proportion of female farmers from the current 30% to 50% by 2023

Adefunke Desh business case | Service package

Farmers receive a comprehensive service package inclusive of inputs pre-financing to ensure timely access of adequate high-quality inputs

Service		Delivery mode	Impact	Revenue model	Status
Training & information	**Farmer engagement**	• Adefunke Desh holds/participates in community workshops	• Increased farmer base • Improved and farmer loyalty	Included in COGS[3] of SME grains	**Operational since 2021**
	GAP and processing training	• Adefunke Desh trainers train farmers, women sorters, sub-aggregators and transporters in workshops and through demo plot	• Increased grain yields and quality • Reduced post-harvest losses	Included in COGS of SME grains	**Operational since 2020**
	GEP[1] and CSA[2] training	• Adefunke Desh includes GEP and CSA modules in training curriculum	• Reduced crop damage from adverse weather events • Reduced environmental damage	Included in COGS of SME grains	**Operational since 2020**
	Weather advisory	• Ignitia provides regular location- specific weather updates to farmers via SMS	• Reduced crop damage from adverse weather events • Reduced input costs from timely application	Farmers pay directly phone credits to Ignitia on a pay per use basis	**Not operational. Planned for 2022**
Inputs	**Provision of high-quality farm inputs**	• Input providers deliver chemical fertilizers, herbicides, seeds and natural Alfasafe to warehouse. Transporters are paid to deliver to villages in coordination with lead farmers • Adefunke Desh prefinances inputs and crop insurance	• Increased grain yields and quality • Reduced aflatoxins	At harvest, input and pre-financing costs are deducted from grain sales	**Operational since 2020**
Equipment	**Solar dryers**	• Adefunke Desh provides farmer communities with solar dryers for use in drying grains.	• Reduced incidences of fumonisin contamination • Reduced grain post-harvest losses	Nestlé and SMEs pay for capex Farmers pay maintenance of solar dryers	**Operational since 2021**

[1]Good Environmental Practices, [2]Climate Smart Agriculture, [3]Cost of Goods Sold

Adefunke Desh business case | Farmer Segmentation and Graduation

Adefunke Desh has recently adopted a farmer graduation approach based on adoption of GAP and loan repayment history. Currently, all farmers targeted to work with in the IDH program are all assumed to be in level 1

	Contract farmer	Sub-aggregator	Sub-aggregator	Sub-aggregator	Program partners
Minimum requirements	• Have farmland and must have been cultivating for at least 3 years • Posses a valid ID card • Understand basic maize agronomy	• Met all level 1 requirements • Contractually repaid loan • Demonstrated leadership by ensuring all group members are supervised and repay their loan	• Met all level 2 requirements • Have a minimum of 10 years farming experience	• Met all level 3 requirements • Have a good followership within the community and able to mobilize loyal farmers	• Met all level 4 requirements • Access to funding to enable aggregation of grains from other farmers
Service cover	3 ha per group	5 ha	10 ha	20 ha	50 ha
Services	• Prefinanced inputs • GEP & CSA training • Weather advisory • Solar drying • Premium markets for commodities	• Similar to level 1	• Similar to level 2	+ • Bonus incentive for delivery of repayment • Access to last mile retail program	+ • Become a program partner where Adefunke Desh guarantees offtake enabling access to finance

On average, farmers are assumed to graduate from one level to the next, after 1 year of being in one level

Source: Adefunke Desh Farmer Graduation Approach document

Adefunke Desh business case | Farmer relationships

Adefunke Desh sources the bulk of its grains through lead farmers. As such maintaining a close relationship with them is important in securing farmer loyalty

Recruitment

- Facilitated through workshops between Adefunke Desh and key lead farmers
- Lead farmer data is collected during recruitment

Adoption

- Trainings are provided periodically in farmer groups by Field and Extension Officers. To encourage adoption of practices, demo plots are used
- Training attendance is recorded, and inputs purchased are registered. Field Officers monitor field-level application of practices
- Farmers that adopt GAP fully and have a good credit scoring receive more input & service pre-financing

Selection

- Farmers are selected based on: Knowledge of crop agronomy, availability of fertile land, willingness to abide to contract terms and reference from their village head.
- As farmers graduate into new levels, service offered are dependent on their loan repayment history and GAP adoption
- Farmers who fail to fulfil the contractual agreement of delivering at least 20 bags of maize (low repayment rates) can only access inputs for a maximum farm size of 1 Ha

Loyalty

- There are no loyalty bonuses for farmers working with Adefunke Desh for a longer time
- Farmers sell at least 20 bags of their marketable maize to Adefunke Desh
- Dedicated extension and field support agent are key to ensuring farmers delivery the required bags (20/Ha) to repay the input and services pre-financing
- Adefunke Desh pays a premium of 10 Naira per kg above market rate for any bag, in excess of those required to cover input costs, delivered by the farmer to Adefunke Desh

Adefunke Desh business case | Gender

As the first woman owned business in the agro-processing sector, Adefunke Desh strives to ensure that women have an opportunity to hold strategic positions in the business.

	Answer	Explanation
Gender Strategy Is gender equality a strategic goal for Nestlé which is communicated in documents?	**Partly**	Adefunke Desh currently strives for a minimum of 20% female farmers onboarded and supported in their systems. When the targets falls below that 20%, men cannot access inputs anymore and must instead allow their spouses to enrol
Data Collection Do you collect data on staff or customers / farmers disaggregated by gender?	**Partly**	Adefunke Desh collects data of both staff and farmers desegregated by gender and age.
Inclusive workplace Does Adefunke Desh have policies or practices to make the workplace inclusive for both women and men	**Yes**	Adefunke Desh has roles exclusively reserved for women the ensure we have a good female representation. Since we work in a male dominated industry, such roles are mostly training and development, admin and procurement, HR, finance.
Inclusive consultation Does Adefunke Desh speak to or consult both male and female customers (farmers) to learn about their different needs and preferences when designing a product	**Yes**	Adefunke Desh reaches out to both female and male farmers to understand their different needs. For instance female farmers are usually not engaged during non production season. They ted to go into trading. For this Adefunke Desh is rolling out the last mile retail program to engage and encourage female participation.
Inclusive tailoring If services are tailored based on customers' needs and preferences, does Adefunke Desh tailor these based on how needs may be different for men and women?	**Yes**	Adefunke Desh has tailored some specific services such as the last mile retail program to meet female farmers need to be engaged during the off season period. However, general training and input services have no specific gender preference approach.
Independence and control over resources Does Adefunke Desh provide services that allow women to have more independence and control over resources or move into roles in which they can gain more value?	**Yes**	Resources are mostly domestic concerns, however at the organizational level as far as their interactions with women goes Adefunke Desh has women leaders within their farm groups. There is also other female leaders at the industry who coordinate other women, and ensure equity.

Read more about the business case for inclusion here: Optimizing Farm Systems Through Gender Inclusion

Adefunke Desh business case | Gender

Adefunke Desh is gender intentional but could transition into being gender transformative by taking a data driven approach to understand the unique needs of men and women and tailoring services acordingly

Adefunke Desh is gender intentional
The Company has taken steps to at least understand the different needs and constraints of women and men both internally and within the value chain with the goal of ensuring women and men have access to resources.

Gender Strategy	Independence and control over resources	Inclusive Tailoring
• Have in place a written overarching gender strategy with definition of strategic / transformative gender objectives and KPIs that Adefunke Desh aims to achieve. • In the overarching gender strategic plan, articulate how to support gender integration in the service delivery design. • Allocate resources to ensure implementation of gender strategy (technical and financial) • Foster a robust monitoring and evaluation framework that is flexible to adapt to change and capture learnings.	• Increase women's access and control of financial resources through mobile money/personal accounts. • Provide resources, and other support/mentoring (e.g., business development services) to women interested in assuming higher-value and/or leadership roles.	• Identify and address barriers to women participation in highly productive value chain activities through consultative sessions. • Establish diversification of income streams to strengthen women's resilience to shocks. • Establish structures to support women during shocks, such as partnerships with saving institutions, community health units. • Encourage women to form women only self-help groups that best suit their unique circumstances.

Adefunke Desh business case | Strengths and weaknesses

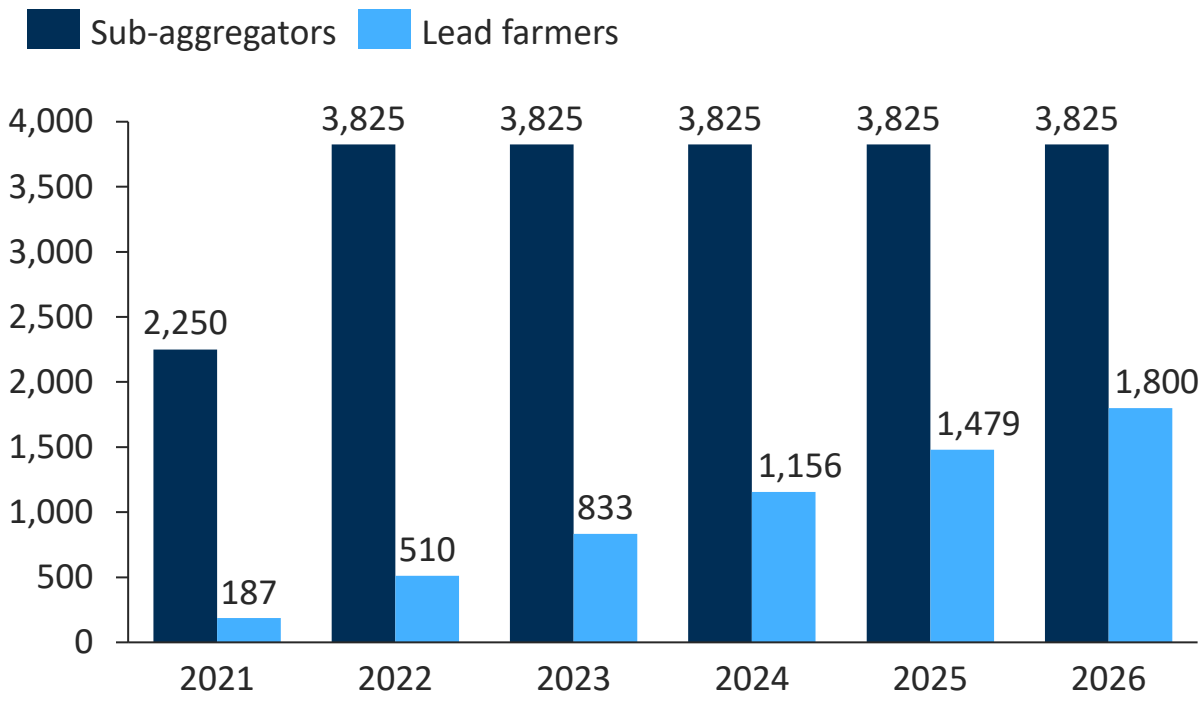
While having a solid vision and strategy, there are clear opportunities to improve the effectiveness and efficiency of service delivery to smallholder farmers

Activity	Status	Strengths	Weaknesses
Strategy & Structure		• Dedicated business entity to smallholder sourcing, integrating service delivery and sourcing	• Does not formulate clear objectives on social targets (income increase, % female workforce)
Farmer Relationships		• Well-structured recruitment and on-going training approach • Decent farmer to extension agent ratio (1 to 300) • Inputs on credit can improve farmer loyalty	• No clarity on what drives farmer adoption of practices • No reward system for loyal or well-performing farmers
Farmer graduation		• Adopted a clear farmer graduation strategy for service delivery thus incentivising farmers to improve performance	• Lack of a biometric system that can be used to track farmer performance. Where farmers change the cluster in which they operate, they are registered as new farmer in level 1.
Services		• Provides recurring trainings focused on GAP, GEP, CSA and processing • Prefinances inputs and offers farm insurance	• Risk of no adoption of weather services as it is still unclear to farmers • Large working capital needs due to input prefinancing
Systems		• Uses Excel based traceability tool developed by TechnoServe • Ability to trace quality and quantity of grains sourced to individual farmers	• Traceability system not integrated, nor widely used • No data and insights on farmer needs
Inclusion		• Remains committed to gender inclusion both internally and at farm level	• Has no documented gender strategy • Does not collect sex disaggregated data at farm level

Adefunke Desh business case | Farmer numbers

To ensure quality standards are met, Adefunke Desh is increasingly working directly with SHFs thus eliminating middlemen

Number of maize sub-aggregators and lead farmers part of SDM[1]



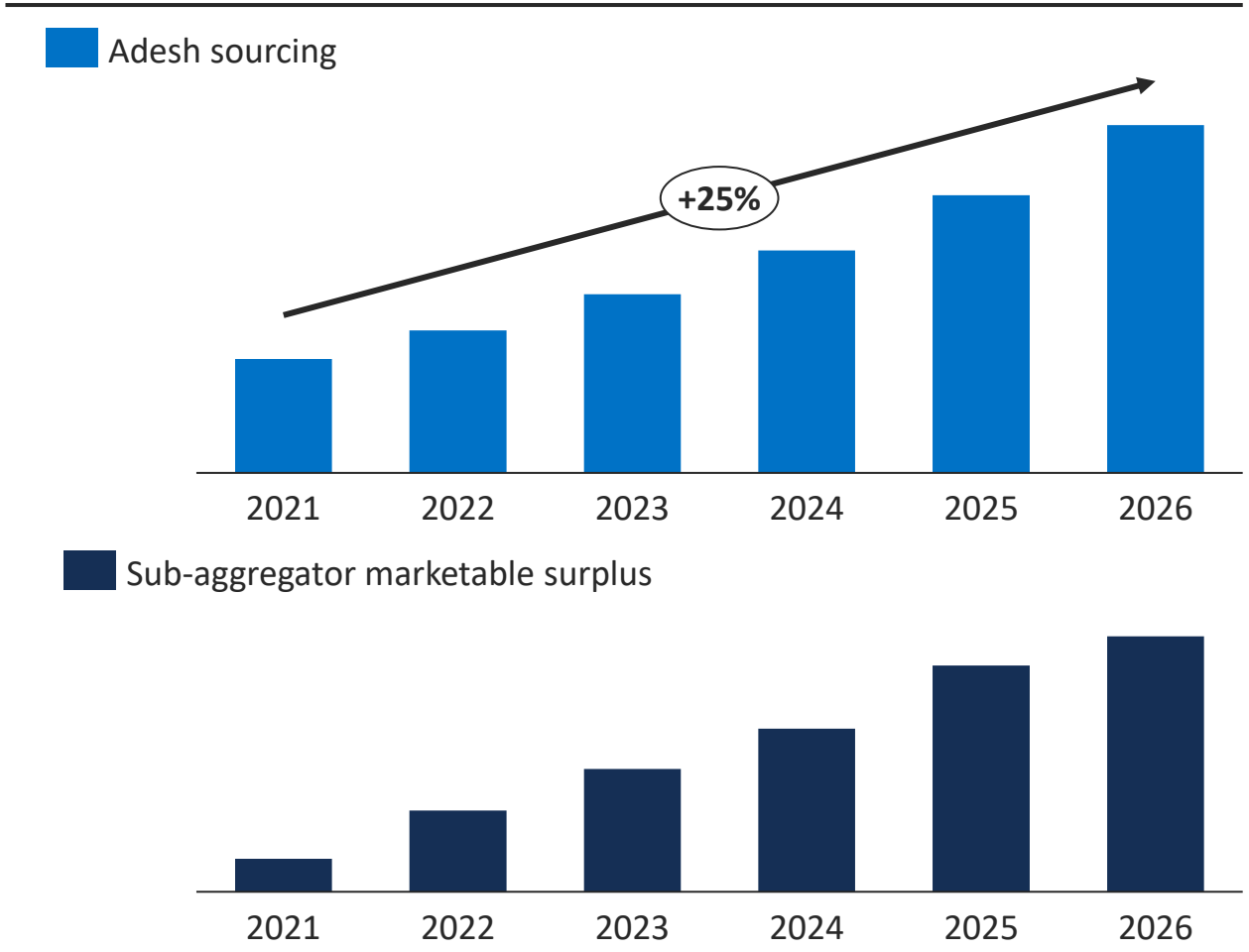
- By increasing farmer income, Adefunke Desh has been empowering the SHFs to source from other farmers thus making them sub-aggregators
- Farmers are organized into Self-help Groups (SHGs) aimed at promoting farmer engagement and adoption of GAP at farm level. Adefunke Desh plays no role in the formation of the SHGs
- Lead farmers play a critical role in ensuring community engagement in farmer trainings offered by extension agents
- Adefunke Desh works closely with the sub-aggregators and lead farmers thus strengthening the value chain linkage

Sources: [1]SDM analysis tool developed by IDH based on discussions with Adefunke Desh

Adefunke Desh business case | Sourcing volumes

Business growth is limited by working capital constraints and availability of high quality grains. There's potential to increase volumes sourced with additional capital injection into the business.

Maize sourcing* volumes[1]



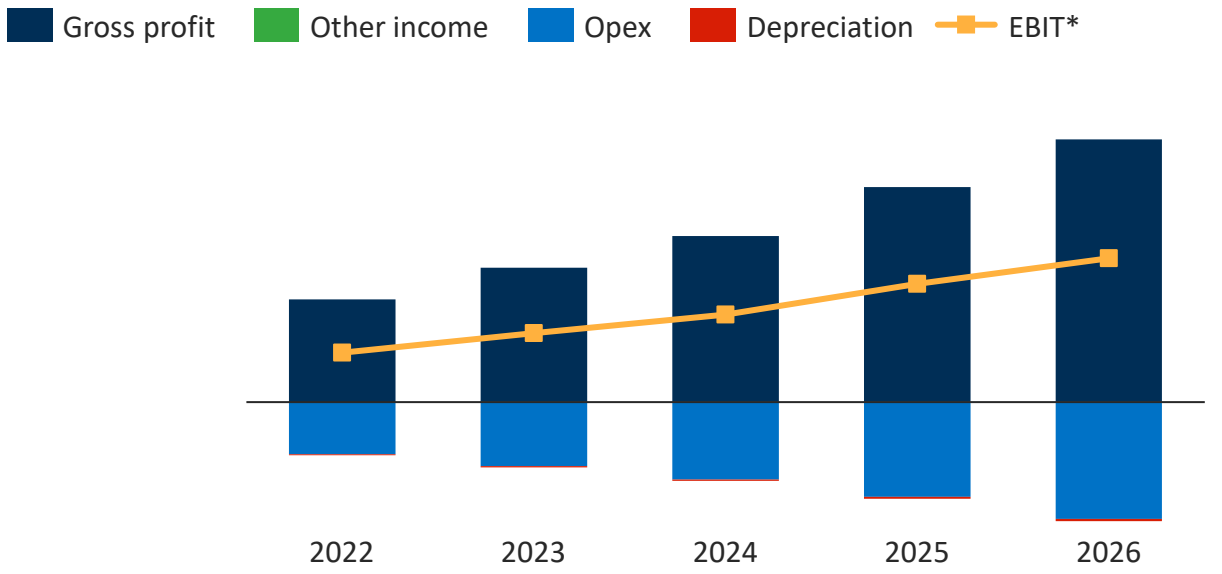
Sources: [1]SDM analysis tool developed by IDH based on discussions with Adefunke Desh, [2]DIGVCN Proposal

- Adefunke Desh has an installed processing capacity of 70K MT annually. However, due to working capital constraints and unavailability of high quality of grains for sourcing, their facilities are underutilized
- With adequate capital, there's potential for Adefunke Desh to source 90% more grain and make an additional 68% in EBIT in 2026
- All else equal and assuming Adefunke Desh can achieve the 90% compliance to Nestlé strict food standards by, Adefunke Desh can contribute significantly to Nestlé's 2023 sourcing target.

Adefunke Desh business case | Annual Profit and Loss

EBIT is projected to grow at c.27% annually between 2022 and 2026 as the income per farmer increases over the same period.

Profit and loss in (2022 – 2026)



Gross margin %	15%	15%	15%	15%	15%
EBIT margin %	7%	8%	8%	8%	8%

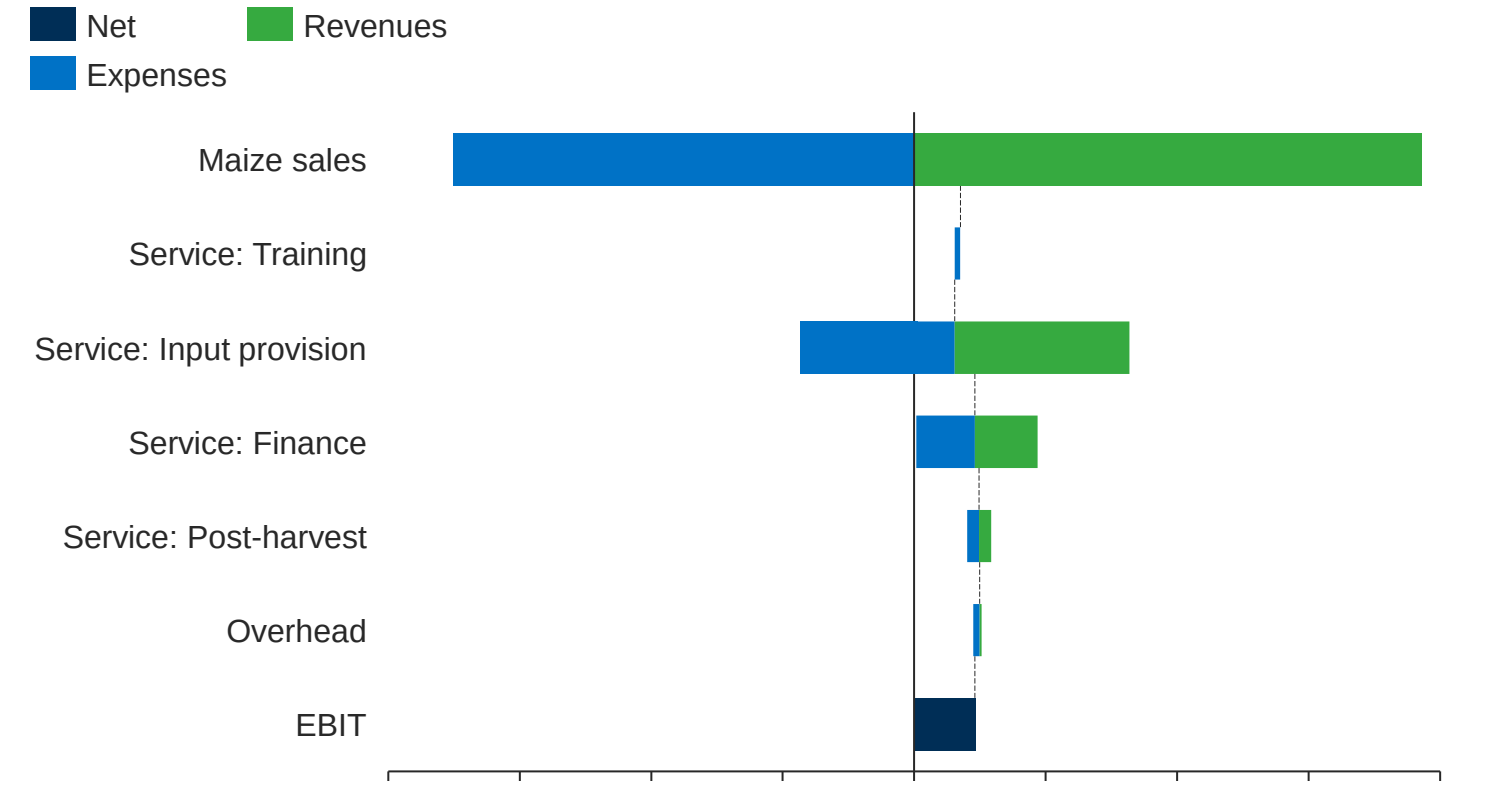
- Commercial income (sale of grains) averages 55% of the total income earned between 2022 and 2026. Service revenue make up for the balance.
- With additional working capital financing, Adefunke Desh can ramp up sourcing of grains. Adefunke Desh is working to secure additional donor funding to support business growth. In 2021, the company received c.$134K from IDH.
- EBIT is projected to grow at c.27% annually between 2022 and 2026.

Sources: [1]SDM analysis tool developed by IDH based on discussions with Adefunke Desh
** Earning Before Interest and Tax, **Net Income*

Adefunke Desh business case | Costs and revenues by activity

Maize sales drives income for Adefunke Desh. Taken together, extending services to farmers remains profitable for Adefunke Desh

Profit and loss, annual average 2021 - 2026



- Supporting farmers to expand their land allows Adefunke Desh to increase their service income per farmer by 205% between 2022 and 2026.
- 100% of all farmers must take up the services provided by Adefunke Desh. This is in line with Adefunke Desh maintaining the quality of grains produced by farmers.
- Adefunke Desh charges farmers a margin on inputs supplied and for pre-financing.

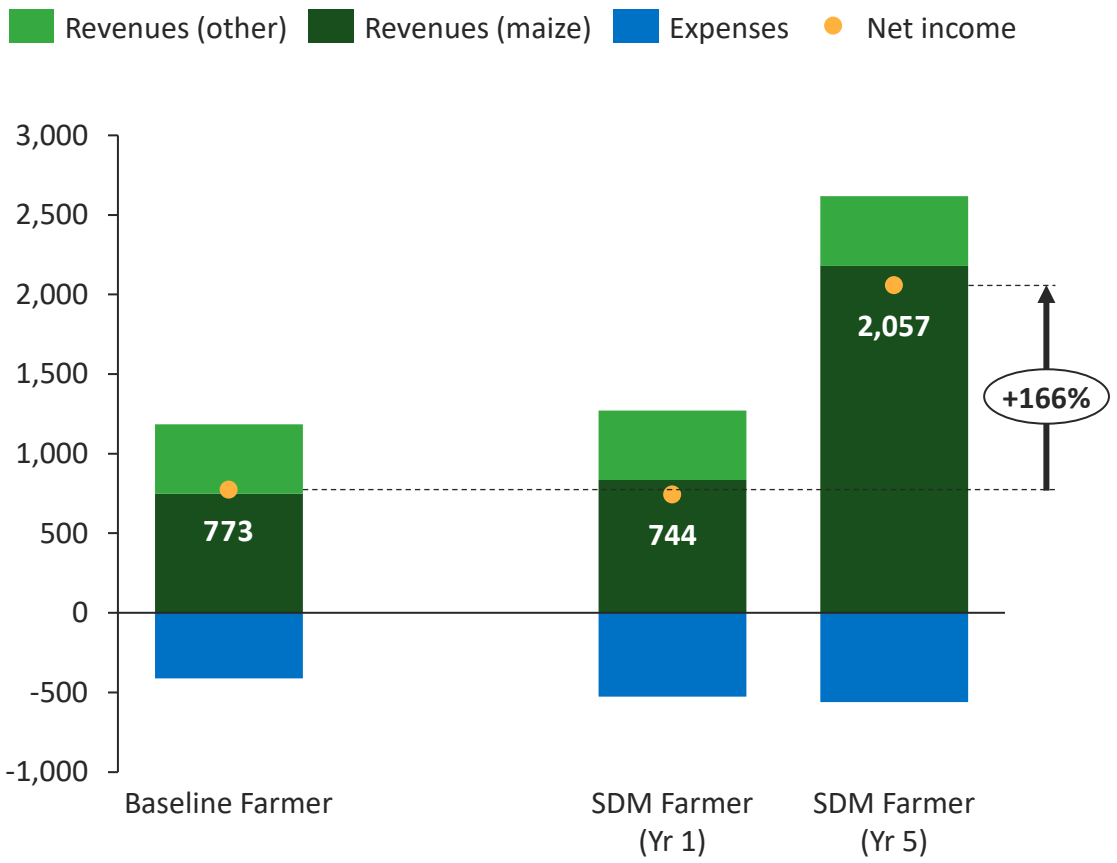
Sources: [1]SDM analysis tool developed by IDH based on discussions with Adefunke Desh

Adefunke Desh | Impact Case

Adefunke Desh impact case | Service impact and profitability per hectare

SDM farmers could increase their income from $780 to $2,060 per hectare in their fifth year resulting mainly from adoption of better farming practices and use of high quality inputs

Revenues, expense and income from maize; in USD ($) per Ha in year 5*



*Sources: SDM analysis tool developed by IDH based on discussions with Adefunke Desh
*Farmer is assumed to have been involved in the SDM for the last 5 year period.
SDM Farmers – Farmers receiving services from Adefunke Desh with a view to increase their farm productivity.
Baseline Farmer – Typical farmer operating in the locality of the SDM farmer but one that does not receive any service from Adefunke Desh

- As farmers continue to fully adopt the GAP trainings and utilize the high-quality inputs provided by Adefunke Desh, it is projected that farm productivity can be increased by 110% to 4.2 MT/Ha within 5 years.
- Farmers typically undertake most of activities except for land preparation, harvesting and post-harvest handling which mainly includes drying and threshing. For these activities they rely on hired labour.
- The highest farm expense incurred is input cost at c.47% and 66% of the total SDM farmer and Baseline farmer costs, respectively. Baseline farmers incur higher input costs due to overuse of fertilizer and higher cost of pesticides unlike Adefunke Desh farmers who benefit from better priced inputs supplied resulting from input hedging.
- SDM farmers receive input pre-financing from Adefunke Desh at 23% interest charge (local credit cost averages 40%). Benefits to the farmers far outweigh the cost of credit as evidenced by their growing profitability.

Adefunke Desh impact case | Service impact and profitability assumptions per farm

If SDM farmers can expand their farm size to 5 hectares, they can increase their income to $8,520 (up from $774) over the course of 5 years

Key agronomic assumptions and farmer financials

Income driver	Modelled assumptions[1]		
	Baseline farmer (YR1)	SDM farmer (YR1)	SDM farmer (YR5)
Farm size (Hectare)	1.0	1.0	5.0
Yield (Kg/hectare/year)	2,000	2,000	4,200
Post-harvest loss (%)	10%	2%	1%
Own consumption (Kg/household/year)	400	400	400
Marketable surplus (Kg/year)	1,400	1,560	20,390
Farm-gate price ($/MT)	535	535	535
Revenues ($/household/year)	748	834	10,900
Cost of production ($/household/year)	412	527	2,818
Other income ($/household/year)	437	437	437

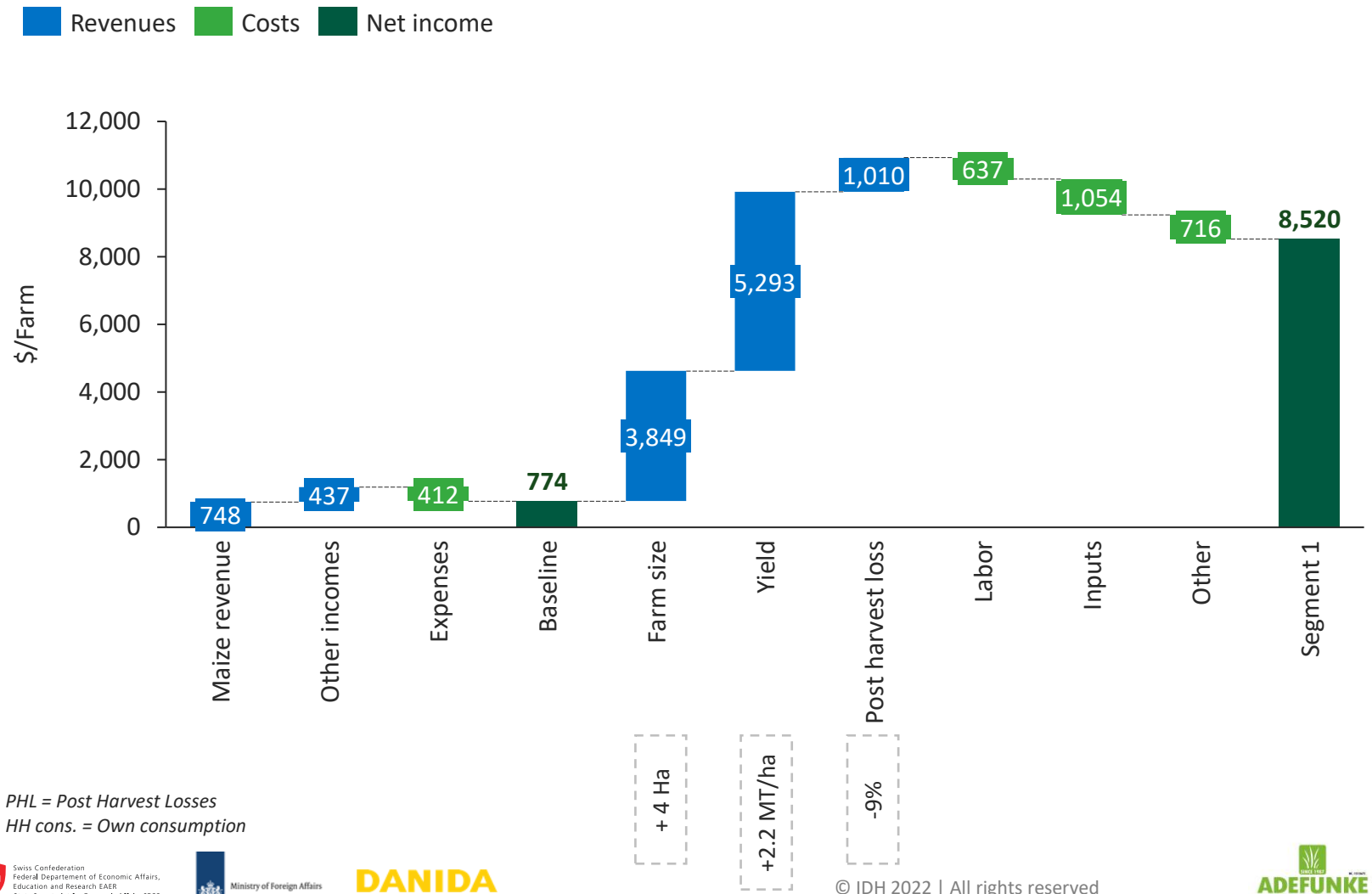
- With input pre-financing, it is projected that SDM farmers can increase their cultivated farm size from 1 Ha in year 1, to 5 Ha, in year 5.
- SDM farmers incur notably lower post-harvest losses due to their adoption of proper post harvest management practices.
- Adefunke Desh pays the prevailing market price for the grains sourced from the farmers. However, any bags in excess of those required to repay Adefunke Desh for inputs and credit, attract a premium of $0.02/Kg.

Sources: [1]SDM analysis tool developed by IDH based on discussions with Adefunke Desh

Adefunke Desh impact case | Cost and revenue drivers per farm

Increased yields, a larger farm and reduced post-harvest losses are key drivers of the income uplift for maize farmers. Additional expenses on labor, inputs, equipment and finance are easily offset.

Revenues, expense and income of maize crop; in USD ($) per farm in year 5



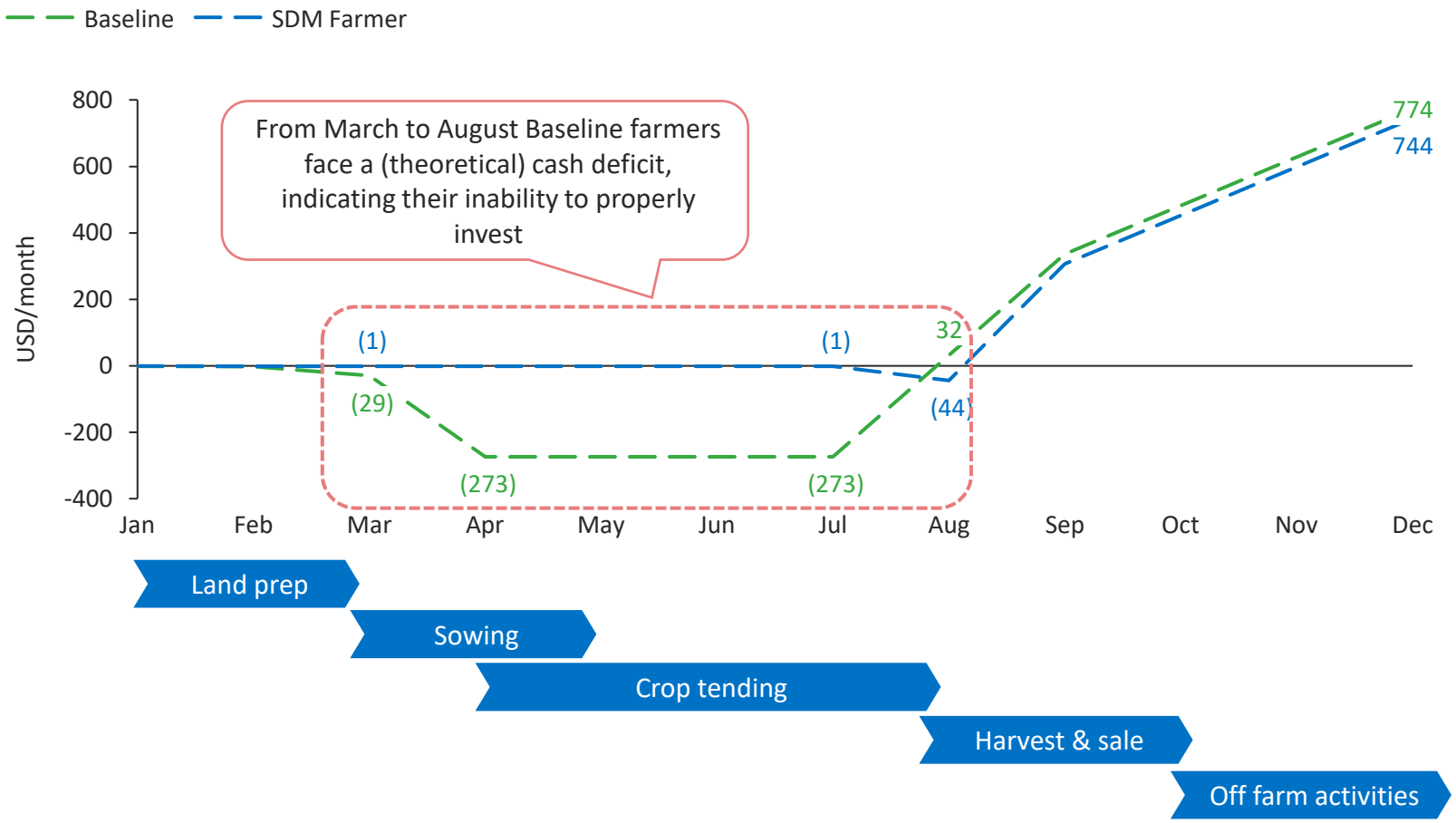
PHL = Post Harvest Losses
HH cons. = Own consumption

- Farmers can only attain the projected income by full adoption of GAP training and with input pre-financing.
- With the projected increase in farm size and yield, farmers can earn enough income to enable them to expand their farms with one hectare year on year
- SDM farmers are assumed to attain 1% post-harvest losses by year 5 due to training and equipment

Adefunke Desh impact case | Maize farmer monthly cashflow

Baseline farmer are cash-constrained, unable to afford quality inputs. Prefinancing allows Adefunke Desh farmers to make the upfront investment. With good performance, farmers can expand their farms next year

Cumulative cash flow* for maize farmers in USD per farm per month – Year 1[1]



- In theory Baseline farmers would be able to earn similar incomes as Adefunke Desh farmers at end of season ($774 vs $744)
- However, Baseline farmers are cash-strapped from March onward, hindering them to properly invest in their farms, resulting in poor crop performance. The $774 income is likely not being met
- Prefinancing offered by Adefunke Desh is key to cover the $273 upfront input expenses. The potential uplift seems to outweigh the $90 finance expenses
- As long as adoption of GAP and repayment rates are good, farmers can apply for larger loans next year

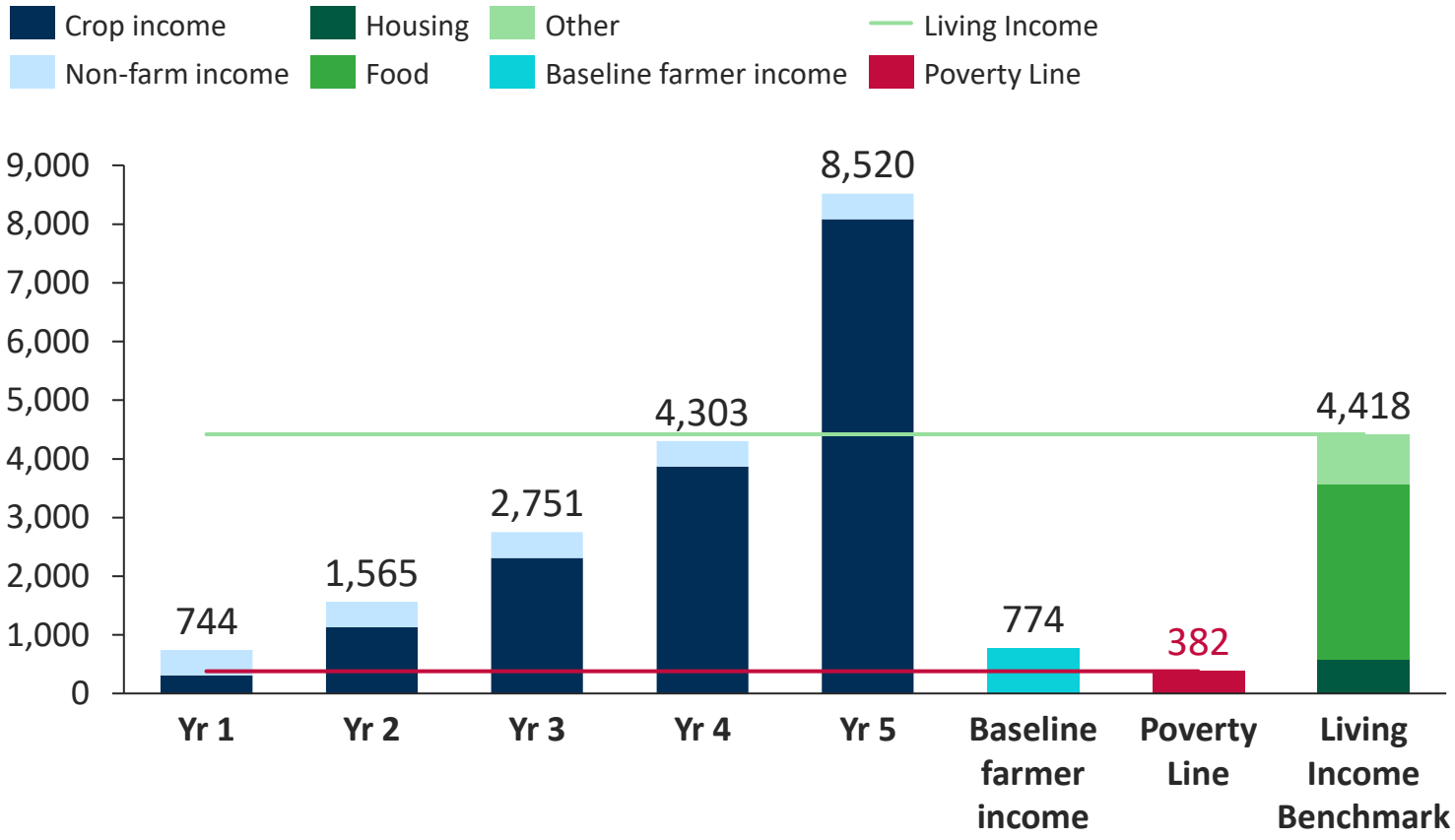
Sources: [1]SDM analysis tool developed by IDH based on discussions with Adefunke Desh

**It is important to note that the projected farmer cashflows do not factor in household expenses such as school fees, medical expenses etc. These expenses could lead to a different result if considered.*

Adefunke Desh impact case | Annual household income and living income gap

Based on Adefunke Desh' assumptions on farmer impact (yields, farm size, post-harvest losses), farmers appear to be able to reach a Living Income after five years of receiving services from Adefunke Desh

Annual income and gap to living income benchmark, in USD



- From their first year both the SDM and Baseline farmers can earn in excess of the international poverty line of $382/year[1] by c.95% in year 1.
- By increasing farm sizes to 5 hectares and yields to 4.2 MT, Adefunke Desh farmers can attain a Living Income (LI) from maize only
- Closing the LI gap is highly dependent on the farmer's ability to increase their farm sizes. It is highly unlikely all Adefunke Desh farmers will be able to reach it.
- It becomes clear that increasing farmer yields alone is not sufficient to attain a LI.

The Living Income (LI) is an approximate income needed to meet a family's basic needs including food, housing, transport, health, education, tax deductions and other necessities. The difference between the LI benchmark and actual income is referred to as the living income gap Wage Indicator (Sept 2019). The living income benchmark depicts a typical family of eight members (2 parents and 6 children)

[1] *World Bank*

Adefunke Desh impact case | Income driver analysis

Increasing farmer size or yield are the quickest routes to increasing year 1 farmer income by $1,000

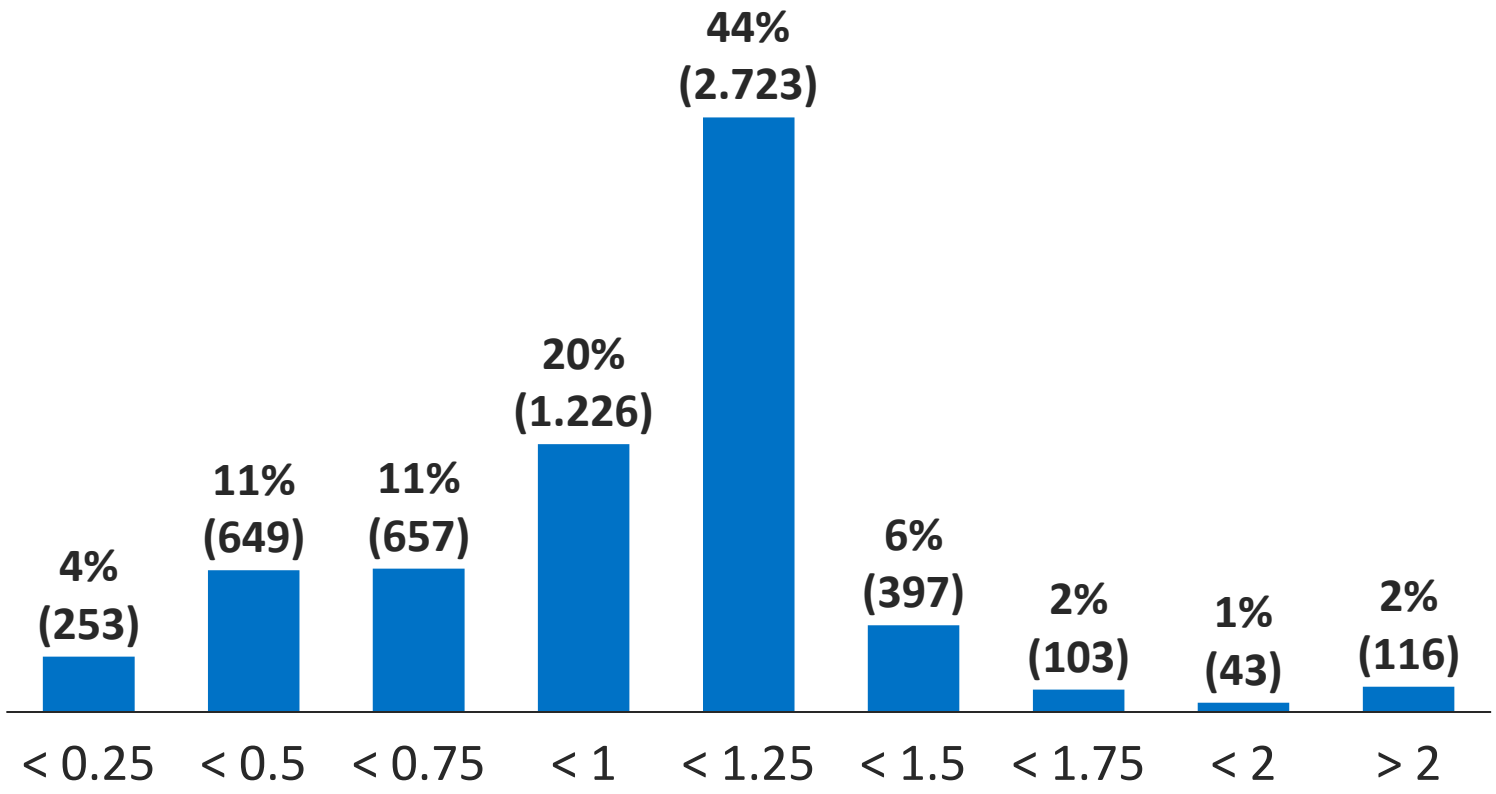
Required change per income driver to increase SDM farmer income by $1,000 in year 1[1]

Income driver	SDM assumption	Required value	% change required	Comment
Farm size (crop in Ha)	1.0	1.9	**94%**	Increasing farm size is the easiest option for farmers to explore in increasing their incomes. This is because farmers already have the required land (max 5 Ha) and would not need to increase their yields beyond their year 1 performance. The main barrier is access to working capital finance.
Yield (MT)	2.0	3.9	**94%**	Improving yields is also an efficient way to improve farmer incomes. However, Adefunke Desh would have to focus their efforts towards increasing farmer yields with their service package.
Farm-gate price ($/Kg)	0.54	1.18	**120%**	Adefunke Desh pays farmers the prevailing market rate for grains sourced. This is done with a view not to distort market dynamics. As such, this option is not the easiest for Adefunke Desh to explore. However, the maize pricing in Nigeria is volatile and increase in farmer incomes could be achieved where the prices increase.
Cost of production ($/year)	527	-473	**-190%**	Even by reducing production cost to nil, farmers would be unable to increase their income by $1,000 in the first year.
Other income ($/year)	437	1,437	**229%**	Increasing other incomes is the longest route to increasing farmer incomes. However, Adefunke Desh does not have control over other incomes earned by farmers.

Adefunke Desh | Annex

Annex | Distribution of farm sizes

Distribution of maize farm size, in number and % of farmers per 0.25 hectare range



- Out of 6,167 registered farmers, 98% have less than 2.00 hectares of land
- 44% owns between 1.00 and 1.25 hectares
- The median farm size is 1.02 hectare
- Given this distribution, including farmers working with Adefunke Desh for multiple seasons, it seems unlikely on all farmer, on average, are able to expand their farms to more than 5 hectares

** Source: Adefunke Desh Field Mapping 2020 Rainy Season. Excluded 14 entries from analysis due to 0's and n/a values. All farmers are located in Kaduna state across various LGAs*

Annex | Farmer revenues and expenses

Indicator	Unit	Baseline	SDM
Farm size	Ha/household	5.00	5.00
Of which main crop	Ha/household	1.00	1.00
Of which fallow land	Ha/household	4.00	4.00
Seasons per year	# of seasons	1	1
Yield: sourcing only	Kg/ha/year	2,000	2,000
Yield: training + inputs + threshing	Kg/ha/year	2,000	4,200
Years until obtaining realizable yield	# of years	5.00	5.00
Post-harvest losses (current)	% of harvest	10%	2%
Post-harvest losses (after 5 years)	% of harvest	10%	1%
Years until obtaining reduced PHL	# of years	5.00	5.00
Bag size	Kg/bag	100	100
Farm-gate price: produce sold to Adefunke Desh	₦/Kg	220	220
Premium paid per bag	₦/Kg	10	10
Farm-gate price: produce sold to open market	₦/Kg	220	220
Farm production	Kg/farm/year	2,000	4,200
Own consumption: share of production	%	38%	38%
Own consumption: volumes	Kg/farm/year	400	400
Marketable surplus	Kg/farm/year	1,400	3,716
% of produce sold to Adesh (current)	%	0%	50%
% of produce sold to Adesh (after 5 years)	%	0%	60%
Years until future loyalty rates are achieved	# of years	5.00	5.00
Other farm income	₦/household/year	0.00	0.00
Off-farm income	₦/household/year	180,000	180,000

Indicator	Unit	Baseline	SDM
Land preparation	Days/ha/season	2.00	1.00
Sowing	Days/ha/season	1.00	1.00
Weeding/chemical application	Days/ha/season	2.00	1.00
Fertilizer application	Days/ha/season	1.00	1.00
Harvesting	Days/ha/season	1.00	1.00
Post-harvest	Days/ha/season	3.00	3.00
Share of hired labor (weighted average)	% of total labor	35%	44%
Average hired labor cost	₦/day	43,000	55,500
Threshing	Bags/ha/season	25.00	35.00
Threshing	₦/Bag/season	200	150
Seeds	Kg/ha/season	20	20
Fertilizer - DAP	Kg/ha/season	100	100
Fertilizer - Urea	Kg/ha/season	250	200
Herbicide - Glyphosate	Liters/ha/season	2	2
Herbicide - Stricker	Liters/ha/season	2	2
Add other inputs	Unit/ha/season		
Seeds	₦/Kg	550	575
Fertilizer - DAP	₦/Kg	311	357
Fertilizer - Urea	₦/Kg	230	258
Herbicide - Glyphosate	₦/Liters	1,950	1,725
Herbicide - Stricker	₦/Liters	3,950	3,450
Add other inputs	₦/bag		

Annex | Farmer revenues and expenses

Category	Unit	0	1	2	3	4	5	Share of expenses %
Farm size	Hectares	1	1	2	3	4	5	
Sales volume	MT/ha	1,400	1,560	3,913	6,968	10,730	20,390	
Main crop revenue	$/year	748	834	2,092	3,725	5,736	10,900	
Off-farm net income	$/year	437	437	437	437	437	437	
Labor expenses	$/year	(104)	(135)	(243)	(351)	(459)	(674)	24%
Mechanization expenses	$/year	(10)	(7)	(16)	(27)	(41)	(77)	3%
Input expenses	$/year	(271)	(265)	(477)	(689)	(901)	(1,325)	47%
Equipment expenses	$/year	(10)	(15)	(26)	(38)	(50)	(73)	3%
Other expenses	$/year	(17)	(16)	(37)	(65)	(99)	(185)	7%
Financing expenses	$/year	-	(90)	(165)	(242)	(321)	(485)	17%
Net income	$/year	774	744	1,565	2,751	4,303	8,520	

Annex | Adefunke Desh service volumes

Farmer numbers	Unit	2021	2022	2023	2024	2025	2026
Farmers	# of farmers	5,000	8,500	8,500	8,500	8,500	8,500
Of which growing Maize	# of farmers	2,250	3,825	3,825	3,825	3,825	3,825
Of which growing Sorghum	# of farmers	1,500	2,550	2,550	2,550	2,550	2,550
Of which growing Soybean	# of farmers	1,250	2,125	2,125	2,125	2,125	2,125
Transporters	# of transporters	150	255	255	255	255	255
Lead farmers	# of lead farmers	187	510	833	1,156	1,479	1,800
Percentage of female farmers	%	30%	40%	50%	50%	50%	50%

Installed capacity		2021	2022	2023	2024	2025	2026
Processing capacity	MT/year	70,000	70,000	70,000	70,000	70,000	70,000
Storage capacity	MT/year	30,000	30,000	30,000	30,000	30,000	30,000