the sustainable trade initiative

Case Report Sierra Agra

Sierra Leone

Service Delivery Model Assessment

2019

NewForesight

Sierra Agra Inc.

the sustainable trade initiative

Reading Guide

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

In this document you will:

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

SDM General Introduction

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

In this section you will:

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

IDH Introduction

Importance of Service Delivery

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

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

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

About this study

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

Thanks

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

IDH would also like to expressly thank the Sierra Agra management and team on the ground in Sierra Leone that have provided information on Sierra Agra's operations and hosted the research team during the field visit of this study. Finally, IDH thanks all stakeholders that were consulted during this study for their active participation.

How it started

The Sustainable Juice Covenant
100% sustainable juice by 2030

The Sustainable Juice Covenant

In 2017, IDH launched the Sustainable Juice Covenant (SJC) to drive market transformation in the global juice sector. Centered on the target of 100% sustainable sourcing by 2030, the SJC is an action-oriented platform of sector frontrunners. The scope of the SJC is global sourcing, and membership is open to companies at all levels of juice supply chains, from production to retail.

The SJC consists of three workstreams: (1) The commitment of companies to work towards the target of 100% sustainable sourcing by 2030; (2) The agreement to share sourcing data for the purposes of annual third-party monitoring; and (3) The option to establish 'issue mitigation' projects in the value chains of SJC member companies, co-financed by IDH.

In 2018, Sierra Agra joined the Sustainable Juice Covenant under the commitment of 100% sustainable sourcing by 2030. Under this commitment, IDH, together with Woord en Daad and Fairmatch Support, is co-financing a project with Sierra Agra to increase sustainable juice sourcing in Sierra Leone.

Translating commitments into action

In 2018, Sierra Agra, together with IDH, Woord en Daad, and Fairmatch Support (FMS) launched the project 'Juice worth the squeeze'. The central objectives include improving the structure of sourcing and the delivery of services to smallholder farmers and expanding the mango and coconut sourcing base from 3,500 to 7,000 smallholder farmers – ensuring that Sierra Agra's business model is both resilient and inclusive. This SDM (Service Delivery Model) analysis will be used to optimize these structures and to better inform the design of the Juice worth the Squeeze project going forward.

FairMatch Support
Committed people creating future proof supply chains

Woord en Daad

Reflection on Learning questions (1/2)

Category	Learning question	Assessment
SDM structure	**How to shift sourcing from collection to commercially-oriented models?**	Commercializing procurement differs per type of fruit sourced: • With the existing mango supplier base and supply exceeding demand, SASL needs to focus on quality of mangoes bought and keep transportation costs to a minimum. • For pineapple SASL can only meet demand if it sources both from smallholder farmers and their own plantation. To expand into new pineapple communities SASL needs a clear value proposition (i.e. timely paying of competitive prices, building trust through frequent visit and keeping to their commitments, providing inputs farmers need). Over time SASL should establish anchor farms in the region to further strengthen the relationship with farmers in the region. • Coconut will be sourced from smallholder farmers, prioritizing those that are willing to grow improved varieties and are easy reachable to keep transportation cost down. Furthermore, SASL is equipping and paying professional teams to harvest the coconut. • Passionfruit, hardly grown by smallholders, will be produced on a SASL managed plantation.
SDM structure	**What can be the optimal structuring of service delivery and sourcing, both from farmer perspective and Sierra Agra's perspective?**	• For indigenously sourced fruits (i.e. pineapple, mango and coconut) service delivery and sourcing are structured around collection centers, with each collection center headed by a community-appointed lead farmer. SASL field staff, each responsible for their own district, coordinates with those lead farmers the buying of fruits and service provision to the farming communities. • To further expand sourcing volumes SASL will need to start operating anchor farms. Anchor farms (see slide 19) will be co-managed with professional farmers, serving as demo plots, nurseries and providing additional raw materials. • The SASL pineapple and passionfruit plantations, located in the Freetown Economic Freezone are necessary complements to the smallholder sourcing model to sustain rapid growth efficiently.
Financing	**What is the most financially viable option to increase the processing capacity?**	• Multiple opportunity pathways to expand capacity and improve utilization are highlighted on slides 43-48. • To assess the most financially viable option to expand, more and more accurate data is required on the capacity and cost of the respective processing investments, and gross margins of the existing (e.g. mango and pineapple NFC) and new (e.g. dried fruits, frozen fruit chunks) products needs to be verified. As costs and benefits become clearer, SASL can strategize on the type (drying chambers, blast freezer) and timing of investment as well as prioritization of fruits to process (depending on gross margins and volumes).

Reflection on Learning questions (2/2)

Category	Learning question	Assessment
Services	**What is the optimal combination of services that can be delivered to farmers?**	SASL is still in process of establishing the fruit supply chains that are under the scope of this SDM. Access to export markets is the main value add for especially mango and coconut farmers. Beyond the off-taking relationships, farmers are served by a combination of training, planting materials and harvesting support, with a slightly different focus given the type of fruit they grow (slides 23-27): • With mangoes in big supply, SASL's priority is preserving the quality of mangoes by providing tarpaulins to prevent damage done when harvesting, transporting and sorting. For farmers, SASL expanding the processing capacity, thereby increasing the volumes of mango sourced would be the priority. • For pineapple, both for SASL and farmers priorities are preventing the damage done by pests, and increasing production through densification and/or expanding their farms by SASL provided suckers. • Coconut farmers have trouble harvesting the tall trees and are thus need to be provided with shorter, higher-yielding variety seedling. Additionally SASL equips professional harvesting teams to help farmers and make harvesting more efficient and timelier.
Farmers	**How to effectively segment and organize farmers?**	Currently farmers are segmented based on a combination of their level of professionalism and geography. Service provision is tailored accordingly (slides 31-34): • SASL has recently started to dedicate more advanced services to more eager and higher-performing mango farmers. This allows SASL to target certain collection centers first and improve sourcing efficiency. • In order to gain trust and increase loyalty from more professional, more demanding (access to competitive markets) pineapple farmers in North & South, SASL needs to provide a more holistic service package: paying competitive prices in a timely manner, providing suckers and tools, visiting the communities frequently. However for farmers in east, increased volume of sourcing, providing basic training and farm tools can improve the relationship with them. • SASL should prioritize working with farmers willing to grow coconut commercially: creating high-density plantations with improved varieties, ideally located closer to the factory.
Application and impact	**How to increase quality of sourcing from farmers?**	• For all fruits damage should be prevented at all stages of the cultivation and post-harvesting process. Farmers benefit by being trained on good agricultural practices, and provided with the right inputs (e.g. nets, organic pesticides), harvesting tools (e.g. tarpaulins, machetes) and harvesting support in the form of professional teams. • Transport can significantly affect quality. SASL should try to minimize the distance from collection centers to the factory and make local transporters accountable for breakdowns of trucks.

Overview and objectives of the SDM

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

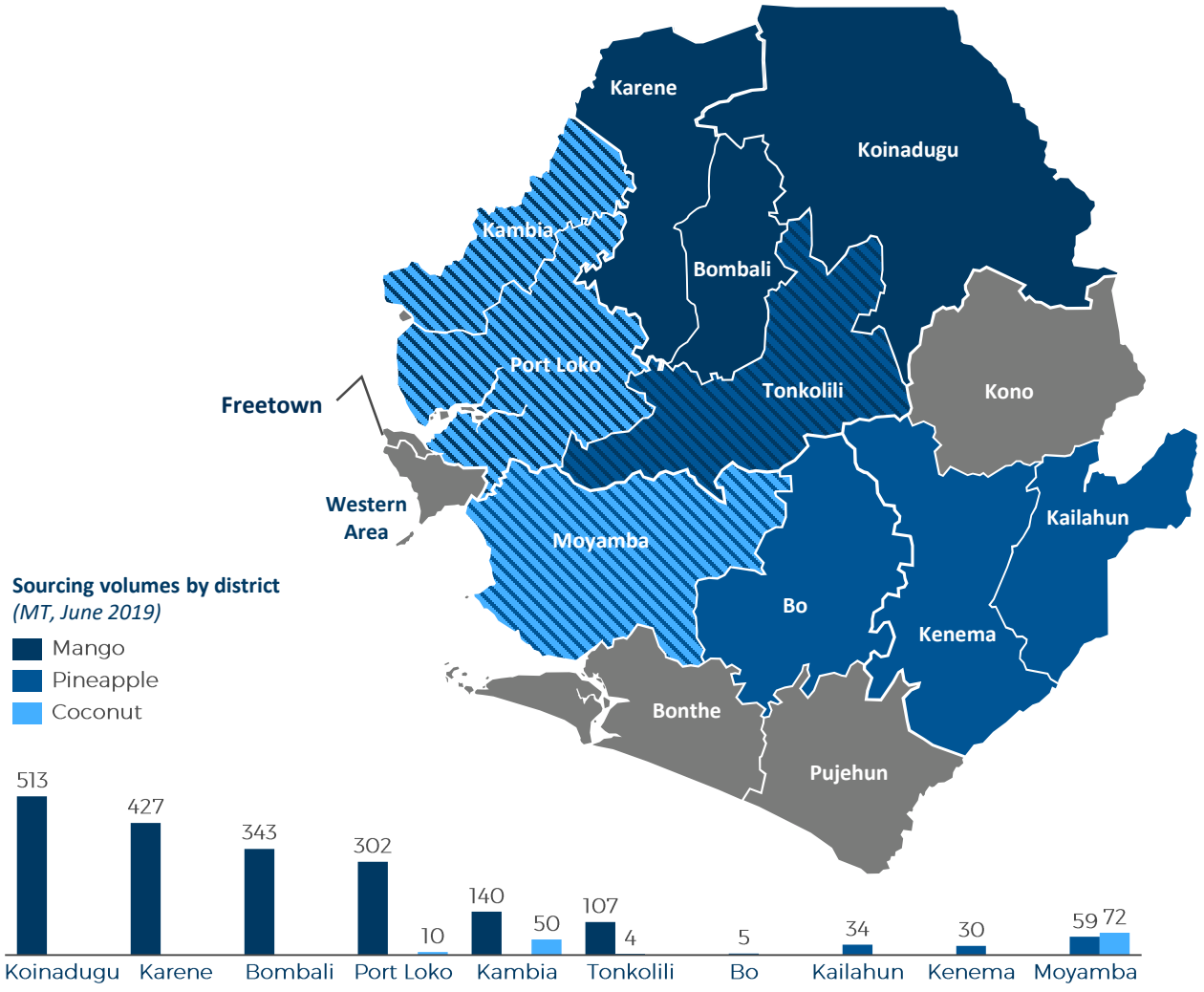
In this section you will:

- Learn the basics about the SDM partner
- Understand the value chain in scope
- Get an overview of the flow of goods and resources in the SDM
- Understand the objectives of this SDM

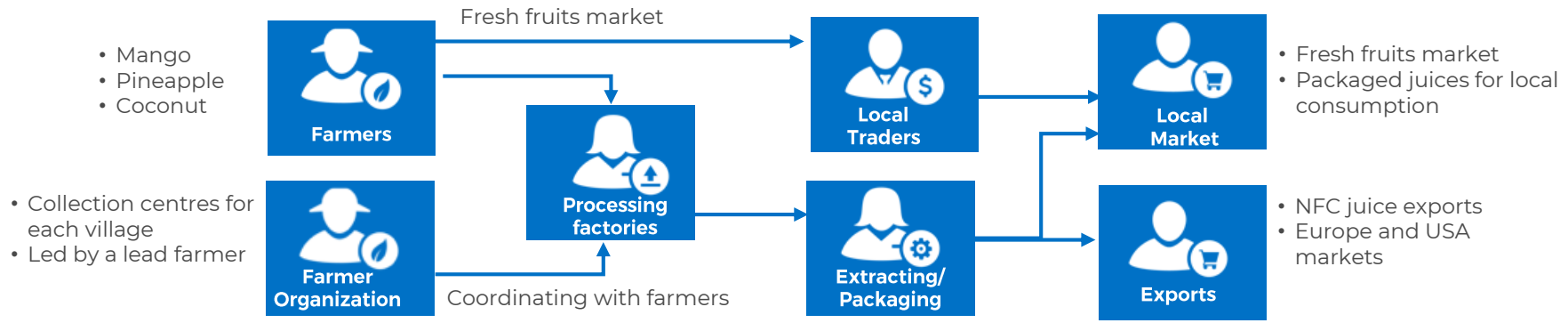
Introducing Sierra Agra in Sierra Leone

Sierra Agra Sierra Leone

- Sierra Agra Sierra Leone (SASL) is an organic and fair-trade juice processing, whole fruit sales and exporting company in Sierra Leone, West Africa.
- Established post-Ebola crisis, the company plans to expand its current production from mangoes, coconuts and pineapple to passion fruit and oranges.
- The company operates a processing factory at a special economic zone outside of Freetown. Sierra SASL sources mangoes from 3,500 farmers (90% of whom are women) from 60 collection centers.
- SASL sells to local and international clients its core products: fruit concentrate juices and NFC juices. In future, SASL plans to sell mango and orange juice pouches.
- SASL has 9 executives in Sierra Leone and in USA, with 60 full time and 57 part-time workers in Sierra Leone.
- SASL is Fair Trade and Organic certified and is a member of the Sustainable Juice Covenant –a global initiative for a sustainable juice production..



Overview of fruit value chains in Sierra Leone



Mango

- Mango production in Sierra Leone is spread over 6 districts in the northern provinces and involving 10,000 small holder farmers.
- Mangoes are grown on over 5,600 hectares of land area producing an average 17,000 MT of mangoes per year.
- Up to 70% of mango trees are grown in the wild orchards with minimal agronomic practices.
- Nearly 75-80% of total mango production goes waste due to limited local market and limited exports (Sierra Agra is the only processed juice exporter).

Pineapple

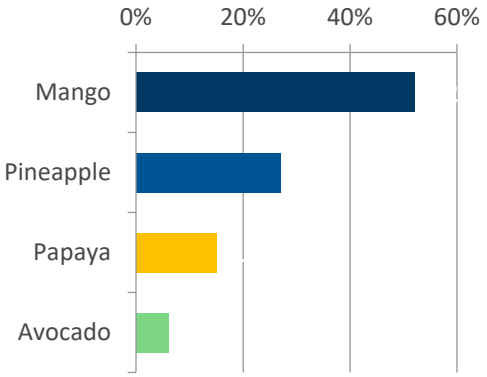
- Pineapple crop is grown in northern, southern and eastern provinces of Sierra Leone. Taiama town in southern region is the hub of pineapple cultivation – farmers benefit from advice and knowhow provided by agriculture university in the vicinity.
- Strong local consumption demand resulting in wider market, presence of more traders and competitive market price.
- Due to above mentioned factors, farmers find pineapple farming attractive . Consequently, farmers are increasing area under pineapple cultivation.

Coconut

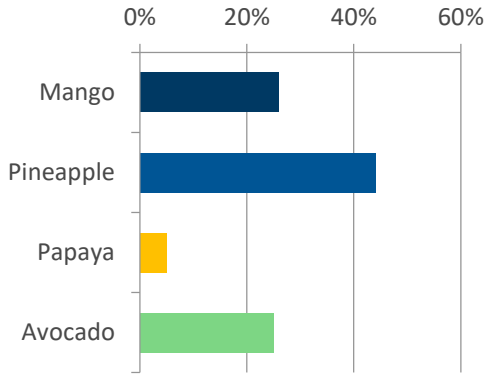
- Coconut trees are located mostly along the coastal regions. Sherbro Island in southern region is the hub of coconut plantations.
- The biggest challenge for farmers is the inaccessibility of coconut trees for harvesting. Marketability of coconuts is further constrained by lack of or poor roads.
- Most of the coconut plantations are relatively old resulting in lower yields and tall trees make them difficult to harvest.

Global trends for mixed fruit juices

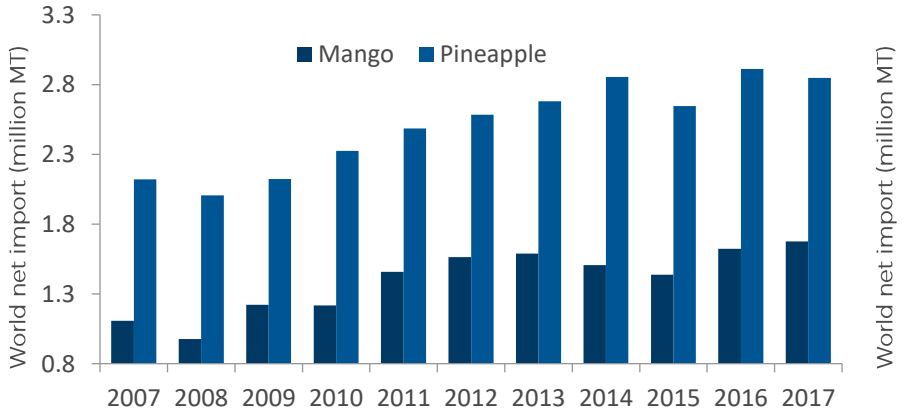
Major tropical fruits 2017 production volume by type[1]



Major tropical fruits 2017 export volume by type[1]



Mango & pineapple worldwide net import (million MT)[1]



Sources: 1: FAOSTAT, 2 Fruit Juice Focus

Aseptic mango puree concentrate 28/30 brix – Imports[2]

MT	2011	2012	2013	2014	2015
USA	23,877	24,752	28,647	35,720	45,237
Germany	18,447	17,625	25,669	26,319	26,319
Netherlands	4,099	9,999	21,561	28,878	28,681

- Most of bottled juice consumed in Sierra Leone is imported. Currently, Capital foods is the only indigenous packed fruit juice company in the country.
- 2017 worldwide production of major tropical fruits (mango, pineapple, papaya and avocado) was estimated at 94 million MT. In terms of volumes, mango accounted for 52% of production followed by pineapple at 27%.
- Globally, pineapple, mango and avocado are the three most significantly traded tropical fruits. However, mango imports of 1.7 million MT (Europe and US accounting for 0.6 million MT and 0.4 million MT respectively) is only 3.5% of total mango production.
- Mango puree imports add up approximately to 100k MT from major importing countries in US and EU). Nonetheless, all of them are showing significant growth in imports from 2011 to 2015.
- Health conscious consumers in developed markets are increasingly demanding organic and nutrient rich fruit and vegetable juice. Tropical fruit and vegetable blends such as kale-mango, spinach-mango, celery-avocado are in great demand.

SDM Stakeholders and Entities Overview

Actor	Legal Status	Function (within this SDM)	Revenue model (within this SDM)	Incentive for participation (within this SDM)
Donor-funded Technical Service Providers				
FairMatch Support Committed people creating future proof supply chains	• Foundation and private company (NL)	• Providing training via local subsidiary, Jula Consultants	• Reimbursement of services by Sierra Agra	• Consulting services
Home Leone Building Communities of Hope with the Poor	• NGO	• Provides services like low cost housing, education, healthcare, power and water/sanitation	• None	• Charitable development organization
SDM operator				
Sierra Agra Inc	• Private company	• Source and process fresh fruits; export of fresh fruit juices (NFC, concentrate juice) • Provides services to farmers	• Selling of processed organic fruit juices (NFC, concentrate juice) in local and export markets	• Strategic collaboration with IDH • Enlarging margins by efficiently providing organic fruit juice • Improve farmers' livelihoods

SDM Stakeholders and Entities Overview

Actor	Legal Status	Function (within this SDM)	Revenue model (within this SDM)	Incentive for participation (within this SDM)
Investors				
Woord en Daad	• NGO (NL)	• Co-financing of the 'Juice worth the squeeze' project; technical support	• None	• Poverty alleviation through business development
idh the sustainable trade initiative	• Public private partnership facility (NL)	• Project co-financing • Support and funding of a Service Delivery Model (SDM) analysis	• None	• Support and catalyze inclusion of smallholders in commercial value chains
mce	• Nonprofit impact investing firm (US)	• Provision of working capital for processing unit	• Interest on loan	• Support financial inclusion of small businesses through loan financing
West Africa Venture Fund LLC	• A Mauritius registered fund	• Equity position in Sierra Agra	• Venture capital fund; Equity in SAI	• Financial return on investment
IFC International Finance Corporation WORLD BANK GROUP	• International financial institution (US)	• Funded technical support: agronomist (2017); HR and finance (2019)	• Grant finance	• DFI that provides grant and soft loan financing in developing countries
TROPICALFOOD MACHINERY	• Private Limited Company (Italy)	• Equity; partnership on processing machinery; on SAI board	• Equity in SAI	• Building company value and generating dividends

SDM Stakeholders and Entities Overview

Actor	Legal Status	Function (within this SDM)	Revenue model (within this SDM)	Incentive for participation (within this SDM)
Value chain partners				
Sierra Tropical	• Private company (affiliated with Dole)	• Cultivates, harvests and processes pineapple for global export. Purchases pineapple suckers from SAI.	• Sales of processed milk • Sales of inputs	• Offtake of pineapple suckers from SAI
CAPITOL FOODS	• Private company (Sierra Juice is a subsidiary of Capitol Foods)	• Client of Sierra Agra	• Sale of juice products within Sierra Leone	• Client of Sierra Agra
TRADIN Organic Global Organic Ingredients	• Private company (sourcing and trading of organic ingredients)	• Sierra Agra has signed an offtaker partnership with Tradin Organic	• Selling of organic juice to end consumers	• Secure sourcing of organic certified and origin traceable fruit juice ingredients
TRADER JOE'S	• Listed retail company (US)	• Client of Sierra Agra	• Grocery retail in the US market	• Client of Sierra Agra
GROUP ECOCERT	• Private company	• Service provider to Sierra Agra	• Provision of organic certification services	• Service provider to Sierra Agra
CAPPA	• CAPPA is an association of commercial agriculture producers and processors	• teach, train and mentor farmers employed by Sierra Agra in its anchor community farms	• None	• Represents sector interests

SDM Objectives

		Farmers	Sierra Agro Inc.	the sustainable trade initiative
		Outcomes per stakeholder		
CORE OBJECTIVE	**1** **Run a sustainable and inclusive mixed fruit juices company in Sierra Leone**	• Improved livelihood and social conditions	• Secured and sustainable revenues in future from operations in Sierra Leone	• Improved efficiency, effectiveness and sustainability of the SDM to enable maximal farmer impact
SECONDARY OBJECTIVES	**2** **Secure and grow supply of sustainable fruits, especially mango, pineapple and coconut**	• Increased income compared to previous farming practices • Increased income from larger farms	• Increased sourcing volumes • Traceability of supply chain	• Expanded smallholder farmer sourcing in a commercially-viable value chain
	3 **Improve incomes and livelihoods of smallholder farmers and their families**	• More resilient farming communities	• Increased and more stable sourcing volumes • Higher farmer loyalty	• More resilient farming communities supported through a commercially viable value chain
	4 **Support the local ecosystem (health services and logistics support for NGOs, taxable revenues)**	• Improved production efficiency • Increased bargaining power • Higher margins	• Improved sourcing security and efficiency • Improved sustainability of the SDM (with FOs providing services)	• Improved sustainability of the SDM (with FOs increasingly providing services)

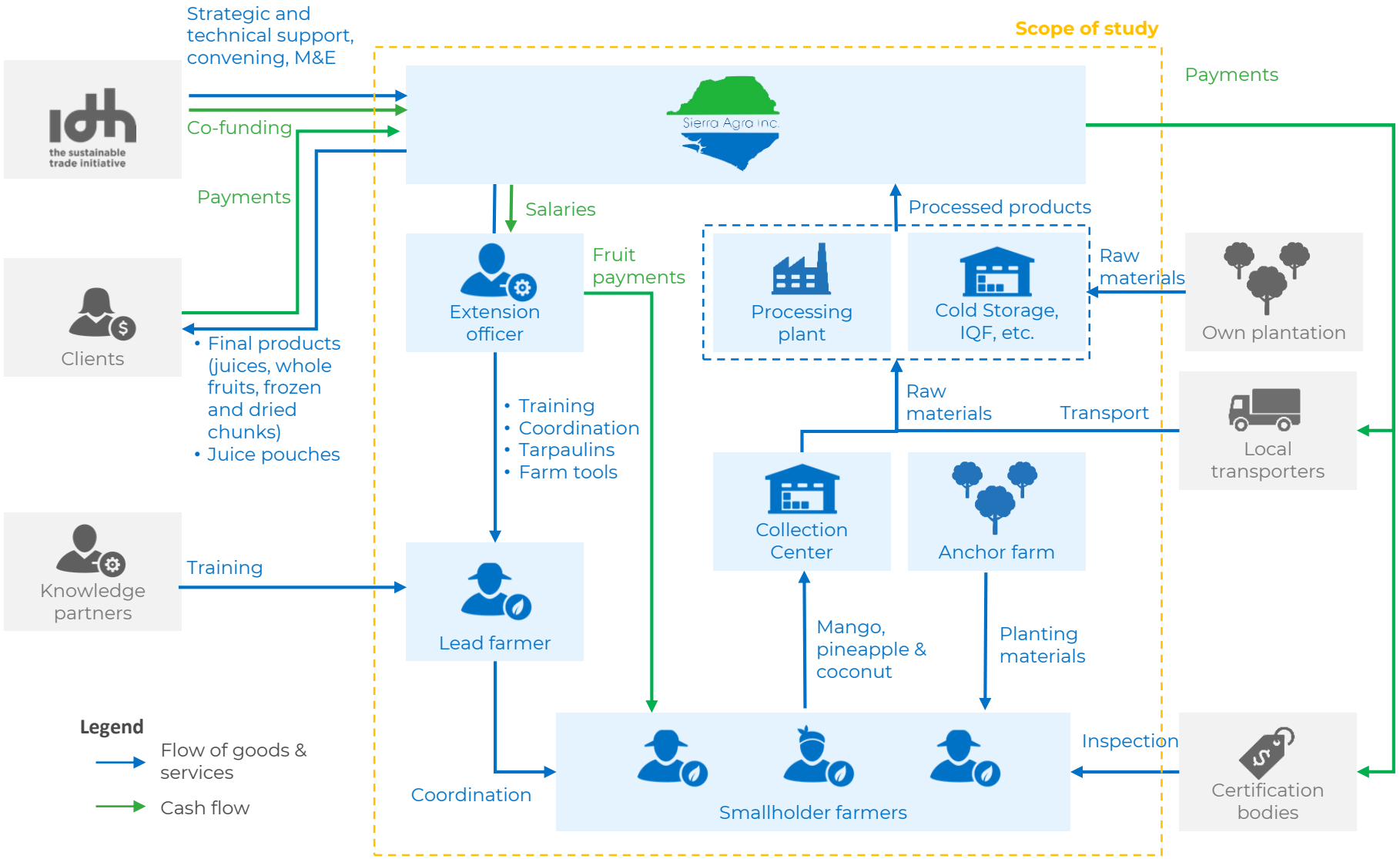
Structure of the SDM

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

In this section you will:

- ✓ Get an overview of the SDM scale in terms of number of farmers
- ✓ Understand the farmer segmentation used for targeting
- ✓ Learn the way farmers are organized
- ✓ Have insights about the enabling environment around this SDM (policies, actors, etc.)

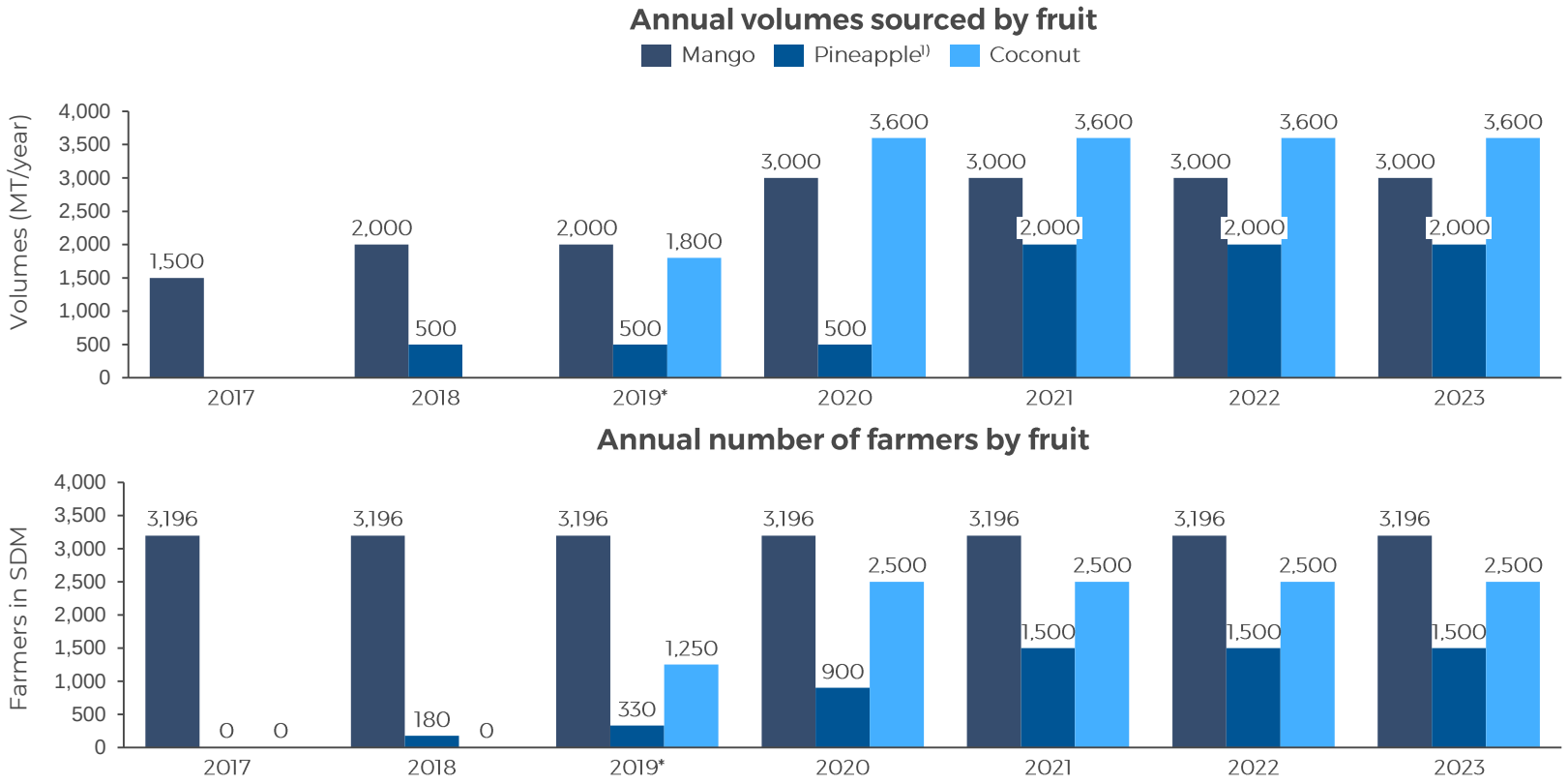
SDM Services and Financial Flows



Description

- SASL has established strong relationships with mango, pineapple and coconut farmers for sourcing fresh organic fruits across different districts of Sierra Leone.
- Farmers are organized into groups through a collection center for each big village or a few small village.
- SASL owns a juice processing plant (capacity to process 72MT/day of mango 25MT/day of pineapple fruits) and warehouse facility at a Special Economic Zone located in Newton, 24 miles from Freetown.
- SASL has entered into a partnership with a consortium of strategic partners to work on various aspects of the organic fruit juice supply chain (from establishing anchor farms to marketing processed juices in developed markets and coordinating other NGOs working directly with famers).

Scale of the SDM: volumes and farmers



2014-15: Scale down
Before scaling down operations due to the Ebola crisis, the plant supported over 4,000 farmers, then owned by African Felix Juice Company.

2016-18: Acquisition
Acquisition completed by Sierra Agra in Dec 2016. Operations gradually initiated since 2016, and a new sourcing structure was established with 3,500 farmers.

2019 and beyond: Growth phase
Growth phase would see increase in the sourcing from already engaged mango farmers, and doubling of the farmers engaged for sourcing of coconut and pineapple.

1) Pineapple volumes shown do not include sourcing from own plantation, growing from 143 Mt (2019) to 18,278 Mt (2023) pineapple per year
*data for this year and onwards are based on projections

SASL operates in both in- and out-grower model

Current
Planned
NA

To be able to scale up production to meet demand for pineapple and passionfruit, SASL needs to significantly expand area under cultivation for both fruits. SASL manages their own pineapple and 100 acre passionfruit plantation. In addition, for pineapple, SASL seeks to establish anchor farms within selected communities that can supply additional fruits and serve as demo farms and nurseries. Currently SASL is already scaling up their plantations, while exploring opportunities (i.e. suitable lands, willing communities) to deploy their anchor farms.

	Smallholder	Anchor farm
Description	• SASL contracts individual farmers. • Service provision and sourcing is coordinated at the aggregate level, the collection centers. • Lead farmers coordinate between SASL and farmers.	• In addition to contract-farming, SASL manages a central plot that functions as demo-farm and/or supplies planting materials. • SASL leases the land and hires laborers for cultivation and harvesting activities. • Revenues are split between SASL and land owner.
Fruits applicable	Mango, Pineapple, Coconut, Passionfruit	Mango, Pineapple, Coconut, Passionfruit
Land ownership	• Farmer owns and manages the land.	• Lead farmer owns the land. • SASL leases and manages the land from farmer.
Payments	• Farmer uses family labor or hires externally. • Farmers buys inputs. • SASL pays farm-gate price for fruits.	• SASL hires labor. • SASL pays land lease. • SASL sources the fruit without paying.

SASL Organizational Structure

- Apex office overseeing overall strategy and operations of Sierra Agra

Office of the CEO, Sierra Agra Inc

Management of Sierra Agra Limited

- Coordinate all company activities in the country including liaising with external stakeholders
- Create work plans and work on strategic responses to certain issues.
- Act as the bridge between field teams and leadership of Sierra Agra

- Sales & marketing of Sierra Agra products in developed markets such as United States and Europe
- Controller for auditing and oversight of accounts

Sales, Marketing and Controller Consultants

Agriculture, TFM and HR Consultant

- Agricultural engineer for advisory on anchor farms
- Tropical Food Machinery (TFM)-seconded production engineer for maintenance & repair of TFM machinery
- Consulting HR manager for advisory on HR policies and labor laws

- Production, storage and quality management
- Plant operations management consists of operations manager, logistics manager, lab manager and chief engineer
- Responsible for smooth running of their respective functions in coordination with other managers

Plant Operations Managers

Supply Chain Manager

- Supply chain manager and supervisor oversee and support a group of 13 extension workers
- They help extension workers' plan for the week based on field priorities determined by head quarters.
- Co-ordinate with logistics team for transporting harvested fruits from identified collection centers

- Processing plant employees responsible for operating various functions of the plant i.e. operating production line, storage of processed juice , security of the plant & premises

Processing Plant Employees

13 Extension Workers (EWs)

Each extension worker manages 5-6 collection centers (consisting of 40-50 farmers). They are responsible for:

- Training of farmers, providing inputs such as tarpaulins
- Buying fruit harvest from farmers , loading fruits into trucks and transporting them to factory

Role of Farmer Organizations in this SDM

Mango and pineapple farmers are organized into farmer groups around a collection center and headed by a lead farmer. Most of the farmers have limited knowledge of GAP and limited access to wider markets. SASL prefers farmer communities becoming more professionally organized to produce high quality organic fruits. SASL helps farmers achieve this objective by training them on organic farming practices, adopting GAP and using appropriate safety gear for personal safety.

Sierra Agra

Farmer group

Lead farmer — Collection center

Farmers

- Lead farmers are trained on GAP
- Co-ordinates harvesting, loading and communicating with SASL
- 40-50 members per collection center per village

- Farmers are trained on GAP by SASL in coordination with lead farmer
- Delivers produce to collection centers
- Sharing of tarpaulins for harvesting and sorting
- Elect lead farmers (often villages elder)

Relationship between SASL and farmer groups:

Establishment: SASL facilitates formation of informal and loosely organized farmer groups (often one group for each village).

Commercial relationship: SASL buys ripened mangoes and coconuts from smallholder farmers directly at a fixed price while pineapple purchase price is determined by prevailing market demand. SASL pays cash to farmers soon after the fruits are loaded into SASL truck. Sierra Agra considers accessible road network, farmer group co-operation and seasonality in prioritizing a collection center over others.

Funding: Farmers do not need to pay any registration or membership fees. SASL trains farmers on GAP and organic farming practices. Training is co-funded by Woord & Daad.

Capacity building: SASL trains farmer groups in organic farming principles, coordinating with extension workers during harvest and farm record keeping.

Relationship between farmers and farmer groups:

Ownership: Each farmer is registered with SASL and belongs to the nearest collection center. Mostly group leaders are selected by SASL based on social status (such as village head, large farm).

Financial relation: Farmers are not required to pay membership fees, nor collective loans or pooling of savings.

Service provision: Farmer group leaders serve as the main interface between SASL and farmers. During harvesting, farmer group leader provides tarpaulin to farmers. Farmers barter labor effort amongst themselves during harvesting and other farm activities.

Services delivered within the SDM

This section expands the information about the services provided to farmers.

In this section you will:

- ✓ Get an overview of the services provided
- ✓ Understand how they are sequenced and how they are related
- ✓ Get a breakdown of the dynamics and flows per service, was well as the delivery method, costs and impact

Overview of Services

M Mango
P Pineapple
C Coconut

Farmer training

- M P C SASL provides all farmers basic training on pruning, business, record keeping and organic farming practices.
- M P C SASL provides advanced training (harvesting, applying organic farming practices) to select farmers based on their location, interest and adoption.
- M P C Farmers applying the trainings correctly will be certified organic. Farmers do not receive organic premiums.

Harvesting support

- M P SASL provides tarpaulins to mango and pineapple farmers for free. Farmers use these to prevent damage to the fruits while harvesting and to ease the sorting.
- C SASL equips harvester teams with machetes and harvesting bags. SASL pays the teams 1,000 SLL ($0.1) per dozen coconuts. SDM farmers incur no costs.

Planting material

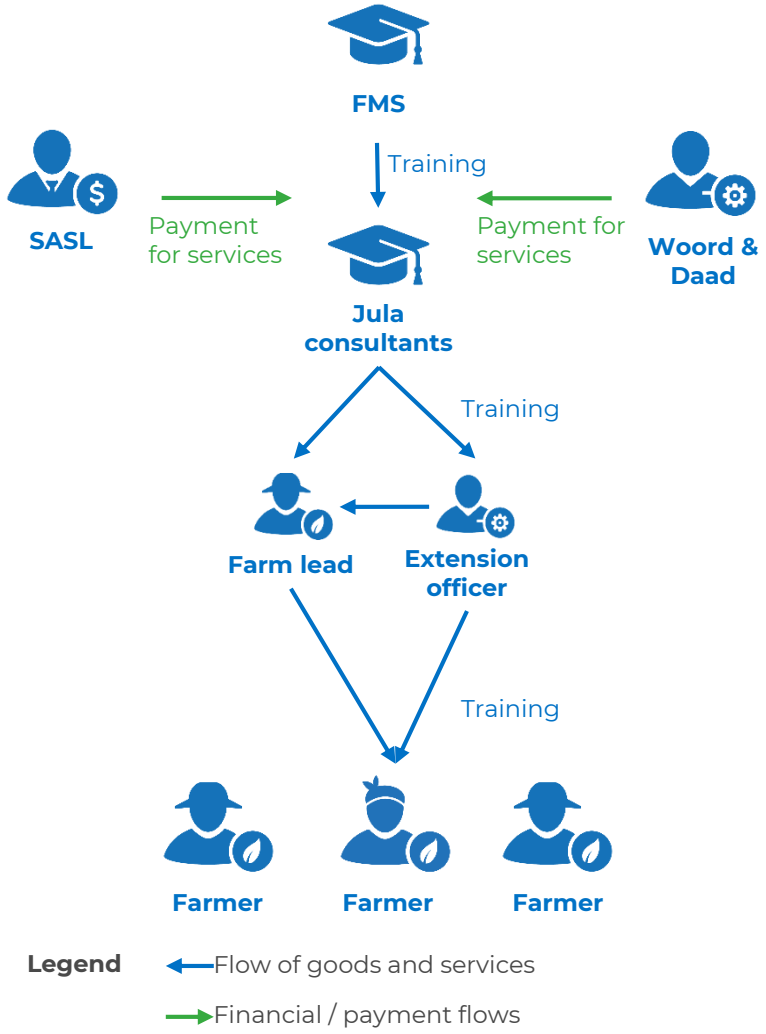
- P SASL operates a 5 acre pineapple farm on their lands to propagate suckers. SASL provides these suckers for free to farmers willing to densify or expand their farms.
- C SASL buys improved coconut varieties from local farmers in the region to provide them to other farmers willing to invest in their coconut farms.

Access to markets

- SASL hires local truck drivers to pick up the produce at centrally located buying centers.
  - M C For most – especially remote – mango and coconut farmers SASL is the biggest buyer.
  - P For many pineapple farmers it saves them the effort of transporting to town, finding storage and buyers.

Farmer training

Detailed overview



Description / Methodology

- SASL extension officers train farmers in good agricultural practices, effective harvesting methods, propagation of suckers (for pineapple) and other agronomic aspects.
- SASL extension officers also provide farm management, recording keeping and organic certification related training to farmers.

Farmers / trainer	250 – 300 per trainer
Years of training	Ongoing
Training modules contents	Brushing of farms, organic farming practices, harvesting
Last-mile delivery	Extension workers
Training method	On the farm

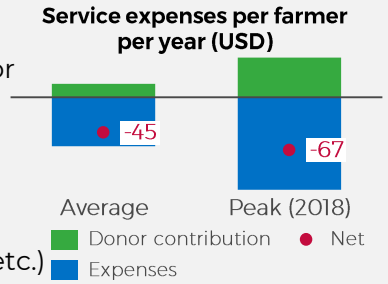
Training Financials

Description

- Field extension staff visits farm.
- Extension officers train and monitor farmers for adherence to organic certification standards.

Cost Drivers

- Extension officer's salary
- Motorbike and fuels costs for field trips
- Basic stationery costs (registers, pens, boards etc.)

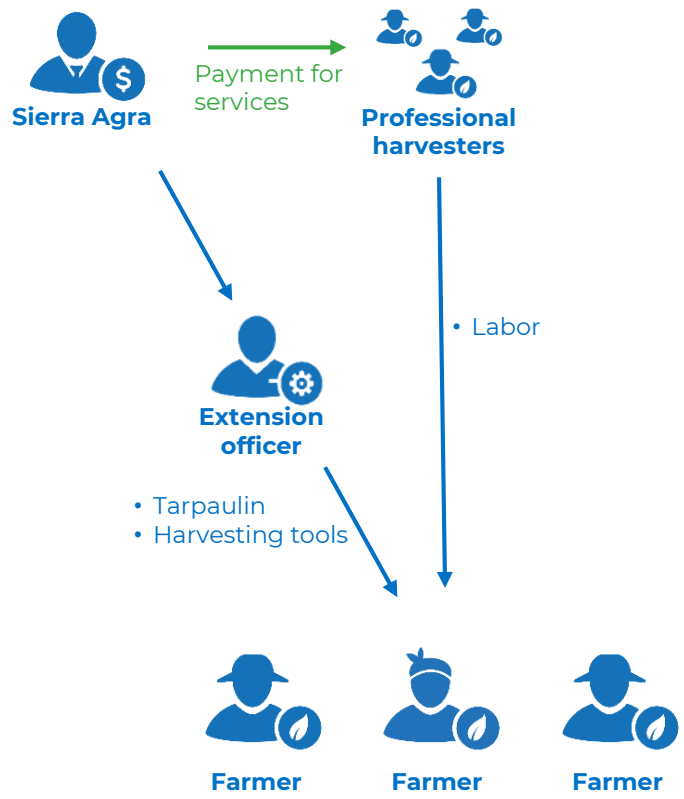


Impact

- Increased quality of fruits
- Increased yield of fruits
- Improved relationship between farmers and Sierra Agra

Harvesting support

Detailed overview



Legend

- Flow of goods and services
- Financial / payment flows

- M Mango
- P Pineapple
- C Coconut

Description / Methodology

C SASL hires professional harvesters and provide necessary tools for harvesting tall coconut trees. The costs involved in aforementioned activities are born by SASL and not transferred to farmers.

M P C SASL plans fruit sourcing in advance based on seasonality, relationship with a collection center and road conditions. Extension officer coordinates with lead farmer in communicating the required quantity of fruits and day of harvesting to a farmer or farmers.

M Lead farmer of each collection center is provided with a tarpaulin, farmers borrow tarpaulin during harvesting and return it back to lead farmer. Tarpaulins reduce damage to fruits during harvesting, sorting and loading into truck.

Harvesting Financials

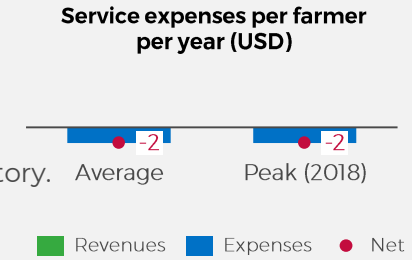
Description

- SASL provides one tarpaulin per collection center.
- For coconut farmers, SASL hires professional harvesters.
- SASL transports harvest from farm to the factory.

Cost Drivers

- Tarpaulins for harvesting
- Hired labor for coconut harvesting

Service expenses per farmer per year (USD)

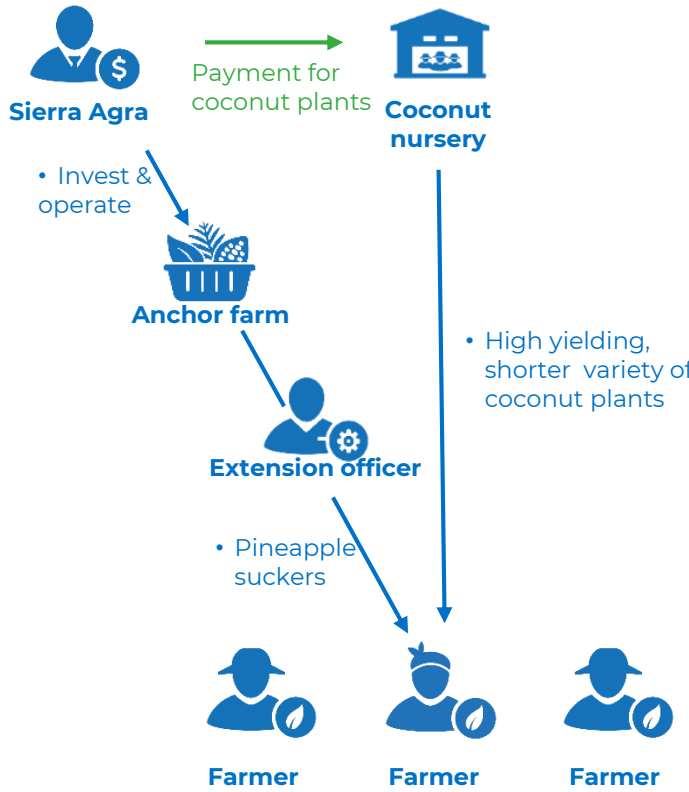


Impact

- Increased revenue due to less damage to crops
- Increased farmer income from reduction in harvesting costs (as cost of professional harvesters borne by SASL)

Planting material

Detailed overview



Legend

- Flow of goods and services
- Financial / payment flows
- M Mango
- P Pineapple
- C Coconut

Description / Methodology

P SASL has established an anchor pineapple farm. This farm provides suckers to pineapple farmers located in other regions. SASL has partnered with Dole foods to supply pineapple suckers to scale up their production, after which Dole will repay SASL in kind (in suckers from their plantation).

C SASL plans to supply new high yielding and shorter variety of coconut plants to select farms (based on accessibility of farm and farmer willingness).

P SASL contracts transporters to deliver pineapple suckers and coconut plants to farmers.
C

P Brownfield farmers use suckers for infilling, increasing plant density and expansion; Greenfield farmers use pineapple suckers for planting new areas.

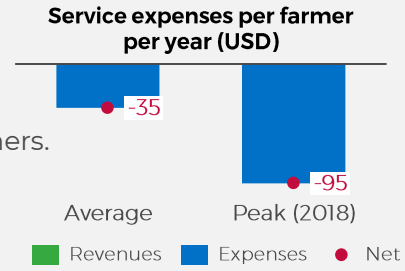
Planting Material Financials

Description

- SASL provides pineapple suckers to farmers
- from its anchor farms.
- SASL buys new high yield variety of coconut.
- plants from other nurseries and supplies to farmers.

Cost Drivers

- Purchasing short variety of coconut plants
- Production of pineapple suckers in SASL farm
- Transportation of planting material to farms

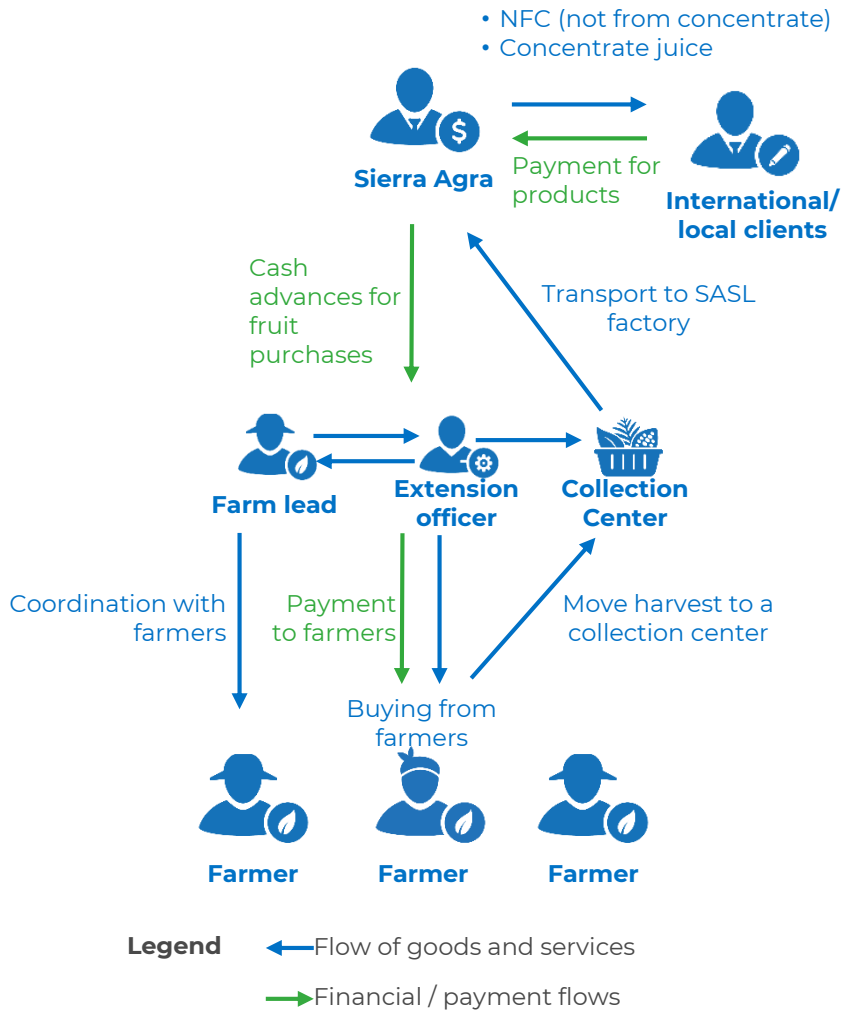


Impact

- Increased production of pineapples and coconuts
- Increased farm incomes of pineapple and coconut farmers
- Resilient farm household income

Access to markets

Detailed overview



Description / Methodology

- Most of bottled juice consumed in Sierra Leone is imported. Currently, Capital foods is the only indigenous packed fruit juice company in the country.
- Globally, pineapple, mango and avocado are the three most significantly traded tropical fruits. Health conscious consumers in developed markets are increasingly demanding organic and nutrient rich fruit and vegetable juice.
- Tropical fruits produced in Sierra Leone are organic by default and available abundantly. Sierra Agra is sourcing organic fruits and processing them to meet local demand for packed juices and demand for organic tropical fruit juice in international markets.

Financials

Description

- SASL markets organic NFC and concentrate juice to international markets and for some extent to local markets.
- SASL buys large quantities of mangoes, coconuts and pineapples that might otherwise be wasted at the end of farmers (because of low demand).

Cost Drivers

- Marketing consultant salaries
- Cost of certifications to access global markets
- Business development effort by SASL
- Logistic costs

Impact

- Increased farmer household income (particularly to mango and coconut farmers) through higher offtake
- Increased income though expansion of area under cultivation
- Improved relationship between farmers and Sierra Agra

Farm-level impact

This chapter presents the analysis at farmer level.

In this section you will:

- ✓ Understand the P&L of the farmers in the SDM according to their segment
- ✓ Understand how relevant factors (eg. market price, quality, input adoption) impact the farmer business case
- ✓ Get an overview of other impacts (social, environmental)

Farmer demographics

	Mango	Pineapple	Coconut
The Farm	• Mango farmers are spread across the country with majority in North. • Farmers are mostly smallholders, having ~2 ha of farmland on an average. Around half of the land is allocated to mango trees and the remaining to food crops. • Farmers generally use negligible amounts of farm inputs.	• Pineapple farms are located in the northern, southern and eastern regions. • Average farm size in the southern region is more (~2.2ha) than that in the eastern region (~1.2ha)[2]. • Farmers in the southern region follow better agricultural practices, and more actively engage in pineapple farming	• Coconut farms are mostly along coastal region. • On an average, a coconut farm measures ~2.2ha[2]. • Farmers generally use negligible amounts of farm inputs.
Household	• Average household size in Sierra Leone is 10 people. • Around 90% of mango farmers are female. Female participation in pineapple and coconut farming is unclear. • Family members rely heavily on farming income and the most of them contribute to farming activities.		
Income	• According to Gallup[1]), the median household income in Sierra Leone is $2,330/year. There is very limited literature about household income from farming. • Income from mango farming contributes ~30% of a mango farmer's total income. Pineapple farmers in the southern and northern region rely only on pineapple farming as their income source, while those in the eastern region engage in farming of other cash crops too for a significant part of the revenue. Income contribution proportion of coconut farming and pineapple farming (in the eastern pineapple production region) is unclear.		

Sources: [1]Gallup worldwide median income survey 2013; [2]Sierra Agra interviews

Farmer challenges

	Mango	Pineapple	Coconut
Agronomic	• Around 70% of mango farms are grown in wild without agronomic practices and farm inputs. • Some (~10%) produce gets damaged during harvesting due to lack of protective gear and equipment. • Pest attack is faced by very sweet varieties of mango, such as Shipton.	• Insufficient planting material of high yielding variety limits farmers' earning potential. • Pests, especially grasshoppers, cause damage to saplings and crop. • Lack of protective gear for farm work exposes farmers to health hazard from poisonous insects and snakes.	• Many farmers lack the capacity of harvesting from tall trees, and there is limited availability of trained harvesters. This leads to difficulties in harvesting, and, sometimes, accidents. • Most of the trees are old and deliver low yields. • Most of the coconut trees are being grown without GAP and farm inputs.
Economic	• Production is much higher than the demand. Approximately 75% production of an average farmer is wasted because of the lack of demand/market-access. • Poor road network in the mango production regions far away from the capital further reduces the market access. • Traders and buyers hold the market power, leading to low prices.	• Farmers face lack of access to financial services and farming tools. • Uneven distribution of cashflow during the year strains farmers' financial situation during pre-harvesting period. • Pineapple farmers in the eastern region, which is difficult to reach, get limited access to demand and receive lower prices as compared to those in southern region.	• Production is much higher than the demand. This leads to wastage of a significant portion of crop. Traders and buyers hold the market power, leading to low prices. • Many farmers try to dry-up unsold crop for oil production market, but the success of this strategy is unclear. • Majority coconut producing regions are difficult to reach, limiting access to market
Social & Environmental	• While not applying agrochemicals in production exposes mango trees to pests, the environmental impacts of mango production are limited. • The wastage of unsold/unconsumed crop leads to prevalence of flies in the farming villages, leading to various diseases. • Seasons of heavy rainfall (flooding) exacerbate challenges in market access and logistics because of poor road networks.	• While not applying agrochemicals in production exposes pineapple trees to pests, the environmental impacts of pineapple production are limited. • Seasons of heavy rainfall (flooding) exacerbate challenges in market access and logistics because of poor road networks.	• Seasons of heavy rainfall (flooding) exacerbate challenges in market access and logistics because of poor road networks.

Farmer segmentation

For each crop sourced, SASL has (or plans to have) **two distinct service packages**. For mango and coconut the main driver for providing advanced services is their willingness to work will SASL. The coconut farmers who are located in easily accessible regions are strategically more important for SASL to ensure cost effective sourcing, and need to be provided additional services. Pineapple farmers in the southern and northern region, who operate in much more competitive commercial environment and follow better agricultural practices than those in the eastern region, need be provided advanced services. Additionally, in line with their social mission, SASL would only provide services to smallholder farmers (20 acres or less).

		Mango		Pineapple		Coconut	
		Basic	Advanced	East	South & North	General	Strategic
Characteristics*	**Access to markets**	Both sell ~5% of produce to petty traders		Medium: struggle to sell the crop and receive lower prices	High: majority of produce sold to local market	Low: located in difficult to access coastal regions	Medium: closer to capital, get better access to market
	Practices	Average	Above average	Below average	Above average	Average	Average
	Willingness	Advanced segment is more eager to adopt		Eager to adopt		Eager to adopt	
	Yield	24 MT/hectare		5 MT/hectare	6 MT/hectare	11 MT/hectare	16 MT/hectare
Services	**Training**	Training	Advanced training	Training		Training	Advanced training
	Harvesting	Tarpaulins	Tarpaulins, Harvesting training	None	Boots and machetes	Harvesting teams as a service	
	Planting materials	None	None	Suckers (densification)	Suckers (densification, land expansion)	None	Shorter variety for land expansion
	Access to market	SASL buys more per farmer from Advanced segment (approx. 10 percent pt. more in 2019)		SASL plans to buy more per farmer from East segment, in the beginning		SASL plans to buy more per farmer from Strategic segment	

Segments are distinct groups of SDM beneficiaries that differ on **farm characteristics** and/or **services received.**

Characteristics include beneficiaries' assets (e.g. land, financial resources), behavior (e.g. trustworthiness, loyalty), and attitude (e.g. eagerness to learn, adopt new practices).

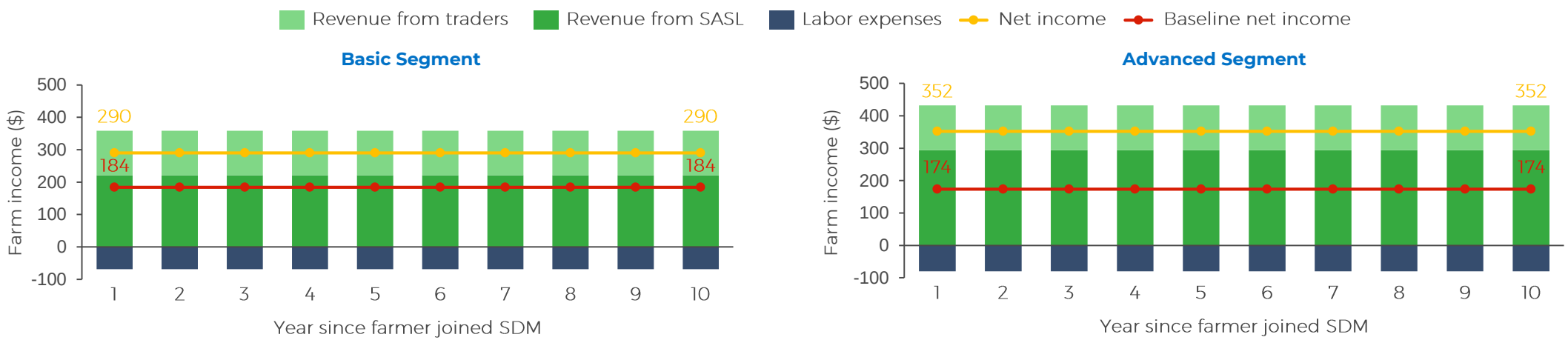
The estimated **SDM impact at farm level** is shown from slide 42 onwards.

Detailed farm agro- and economic **assumptions** to come to those calculations are shown on slide 41.

Projected income for mango farmers

Mango farming P&Ls ($/year) over time

Comparing net income of baseline and SDM farmers from Basic and Advanced segments



Economic sustainability at farm level

- Mango farms are grown organic by default and do not require chemical fertilizers, pesticides or other expensive inputs. Farmer costs are very low and maintain stable, thus revenues due to the SDM reflect directly as a benefit in their net income. Average mango farm size (under SDM) is around 1 acre.
- SDM buys 32% and 43% of mango production from basic and advanced SDM farmers respectively whereas baseline farmers can sell only 10% of their produce to local traders.
- SDM farmers also receive organic practices training, organic certification and are provided tarpaulins during harvesting.
- Income from mango farms consists approximately 30% of household income of SDM farmers. Since this income comes without much effort or risk, farmers see this as a bonus money bolstering their household income.
- Farmers are not motivated or incentivized to invest more in mango farmers unless current production is entirely sold at competitive prices. Cutting of mango trees to make way for other crops can be a key risk .

Main cost drivers

- **Harvesting :** Harvesting is main cost of mango farming. Harvesters are hired by farmers and paid a standard fee of SLL 20,000 ($2) for each tree harvested and SLL 500 ($0.05) for carrying each mango crate to collection center.
- **Brushing:** Most of the mango farms are grown in the wild having other bushes and shrubs. Once a year farmers clear the vegetation along the paths accessing mango trees and under the mango tree just before harvesting.

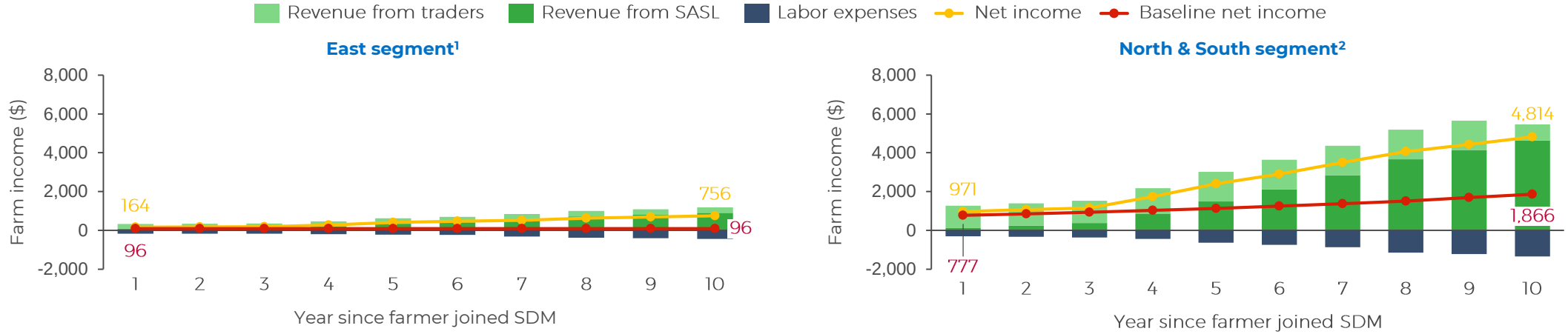
Main revenue drivers

- **Demand and offtake**: Mango trees are grown across Sierra Leone and available in abundance during the mango season. Nearly 75-80% of production goes waste due to limited local fresh market demand and absence of fruit processors other than Sierra Agra. An increase in demand and offtake of mangoes directly results in higher farm income.
- **Price competitiveness:**. Weak demand for mangoes also causes lack of competitive market pricing mechanism.

Projected income for pineapple farmers

Pineapple farming P&Ls ($/year) over time

Comparing baseline and SDM farming net income within East and North & South segments



Economic sustainability at farm level

- Baseline farmers in the East segment earn less from pineapple farming than those in North & South segment because: 1) South & North segment have much better market access ensuring sufficient offtake, and, 2) driven by smaller farms, less plant density and lower market price, East segment hold limited earning potential from pineapple. This results in pineapple farming contributing ~30% to annual farmer income in East segment against ~100% in case of South & North segment. This gap amongst the two segments' baselines is expected to widen with the expected increase in the avg. size of North & South segment farms.
- SDM farmers in both segments are projected to exhibit higher increase in income from pineapple farming as compared to their respective baselines because: 1) GAP training and an offtake promise from SASL are expected to drive increase in plant density, farm size and fruit size, and 2) IPM training is expected to reduce the crop damage to 5%.
- The expected impact of the SDM is much larger on South & North segment due to better initial/projected conditions (agri-practices & market access) and service adoption rates.

Main cost drivers

- **Preparation and maintenance:** regular brushing, when done via hired labor, costs 200,000SLL ($20) per acre.
- **Harvesting:** harvesting and carrying pineapple to collection center, when done via hired labor, cost 1,000 ($0.1) per dozen, respectively.
- **Composting:** compost, which is expected to be produced by farmer via hired labor, would cost 200,000SLL ($20) per pit/application-cycle. The number of pits required for a farm depends upon the plant density and farm size.

Main revenue drivers

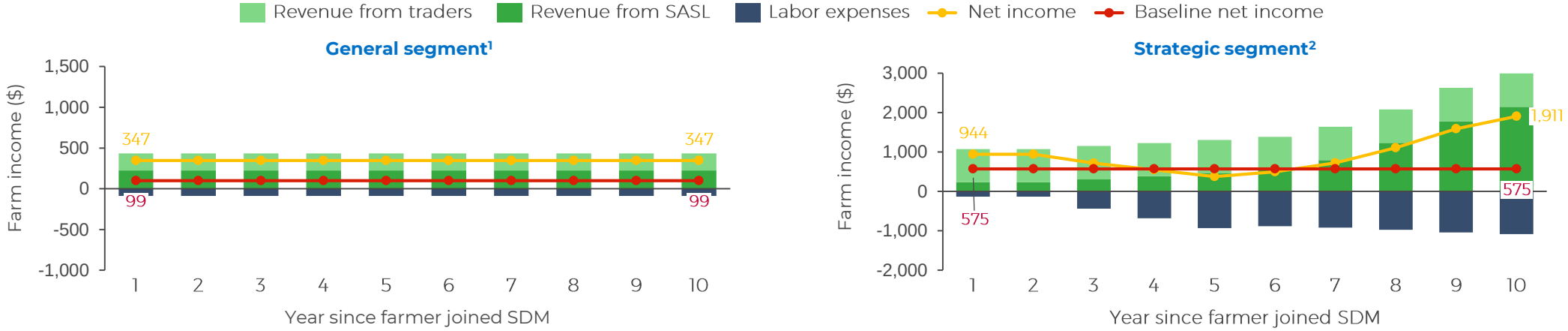
- **Production volume:** Increase in the volume is driven by: 1) Increased farm size, 2) Increased plant density, 3) bigger fruit per plant, and 4) decreased crop loss to pest.
- **Price and offtake by local traders:** Farmers with better access to market and sufficient demand are able to sell more of their produce at higher prices.

[1] Avg. farm size = 0.81 acre; [2]Avg. farm size = 3 acre (year 1)

Projected income for coconut farmers

Coconut farming P&Ls ($/year) over time

Comparing baseline and SDM farming net income within General and Strategic segments



Economic sustainability at farm level

- Baseline farmers in the Strategic segment earn more from coconut farming than those in General segment because: 1) General segment farmers are located in challenging coastal terrains with limited access to market/demand, and, 2) driven by higher production proportion of ripe fruits (which fetches lower price than young ones) and lower offtake by traders, General segment hold limited earning potential from coconut. Above factors result in coconut farming contributing to ~30% of annual farmer revenue in General segment as compared to ~60% in case of Strategic segment.
- SDM farmers in both segments earn more than baseline farmers because of additional offtake from SASL. Strategic segment farmers will be chosen based on the farm connectivity to SASL and willingness of the farmers to cooperate. Strategic segment's income from coconut is expected to increase faster than general segment because SASL plans to maximize sourcing from strategic segment while also increasing their production volumes by encouraging farm expansion and planting of shorter verities.
- There is expected a dip in the cashflow of strategic SDM farmers from year 3 to 8, because they are expected to invest in increasing farm size, and general maintenance of and composting for young unproductive plants. To avoid the cashflow dip, either SASL should ensure financing services for farmers or reduce the rate of expansion*.

Main cost drivers

- **Harvesting :** harvesting and carrying of coconuts to the collection center, done via hired labor, costs SLL 1,000 ($0.1) /dozen, respectively. SASL will provide free harvesting service for their purchase. Shorter plant verities cost much less to harvest.
- **Composting:** compost, which is expected to be produced by farmer via hired labor, would cost 200,000SLL ($20) per pit per application-cycle. The number of pits required for a farm depends upon the plant density and farm size.

Main revenue drivers

- **Demand and price:** Currently supply exceeds demand for local consumption. Providing access to export markets would result in higher offtake and better prices.
- **Production:** Coconut trees are plentily available along coastal regions. Increase in farm production would increase revenue, only if offtake is ensured.

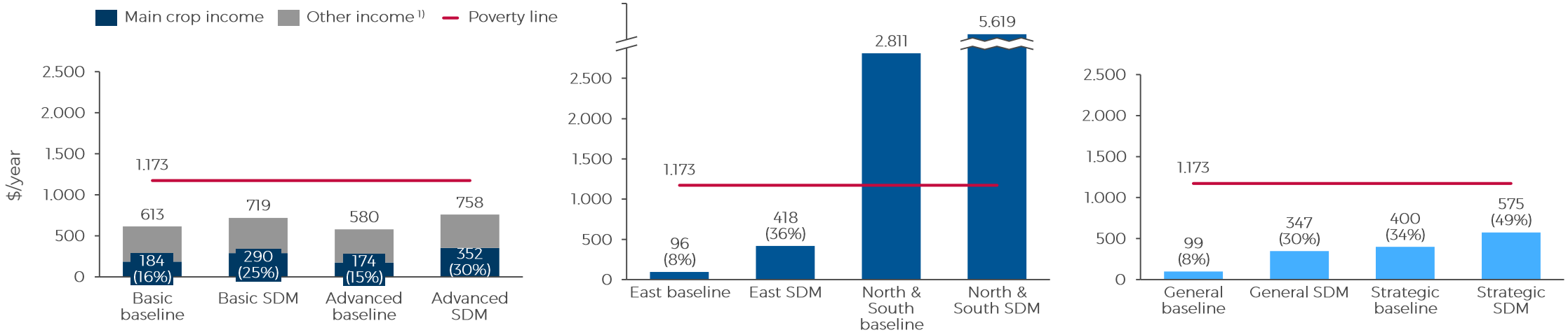
[1]Avg. farm size = 1 acre; [2]Avg. farm size = 1 acre (year 1); *current calculations assume doubling of farm size in 3 years, starting from year 3

the sustainable trade initiative

Farmer income vs poverty line

Closing the poverty gap

Comparing farmer net incomes (year 5 of projections) against the poverty line, $/year.



Mango

Assuming that mango farming contributes 30% of farming household's annual income, an average Advanced segment farmer is expected to earn an annual income of $758 per year.

The Basic segment farmers are expected to earn 12% less than the poverty line. As the take-off per farmer by SASL is planned to stay constant, no further increase is expected in the current incomes.

Pineapple

There is a good potential for bringing the pineapple farmers out of poverty if SASL decides to scale-up its pineapple processing and off-takes as much as possible from the farmers. This will drive farm densification and expansion in North & South segment, leading these farmers to rise above the poverty line within two years. These farmers have potential to rise 3.2x above the poverty line.

Similarly, driven by farm densification, East segment farmers who are currently at ~50% of poverty line are expected to touch poverty line in 10 years.

Coconut

Driven by the off-take by SASL, the current overall income of General segment farmers can reach just below the poverty line. They will earn almost double of that of the baseline ones.

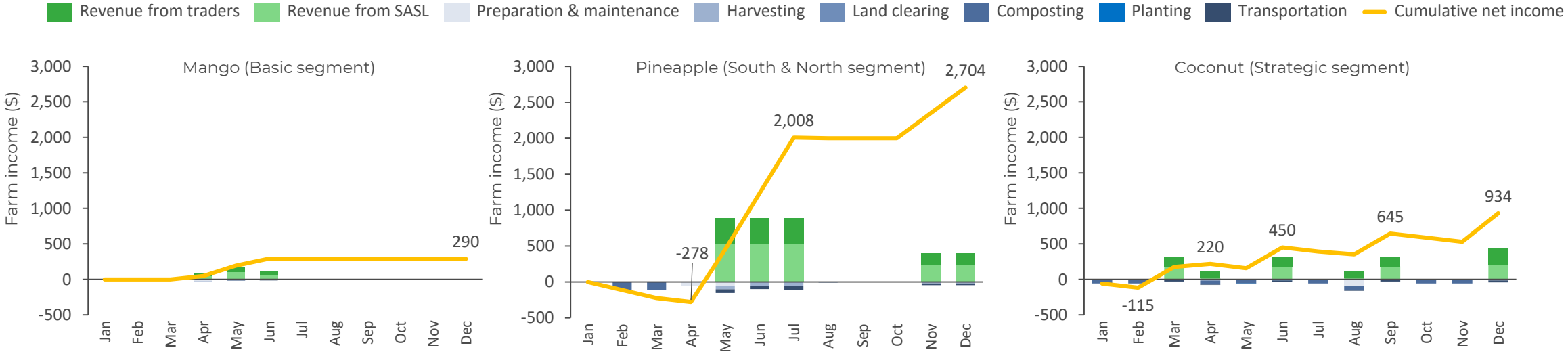
Strategic segment farmers who decide to invest in farm expansion for SASL would descend below the poverty line if not supported financially or if an aggressive farm expansion is pushed. But in long term the Strategic farmers are able to grow their way out of the poverty.

1) Other income can only be shown for mango farmers as % of total household income coming from a certain crop is only known for mango (30%). There is no data on available for pineapple and coconut

Cash-flow

Farmers monthly cashflow ($/month)

Cumulative monthly cashflow of SDM farmers (select segments) – averaged over 10 years



Mango

Mango farmers are mostly subsistence farmers who consider mango farming as an additional activity that might generate some revenue for them if they are successful in selling a part of their crop in the extremely oversupplied mango market.

Because they (both Basic and Advance segments) are able to only sell a small part of their mango produce, they are investing minimally before harvesting.

Pineapple

To develop sustainable relationships with the farmers in a highly competitive market (North & South segment) and secure necessary supply, could provide financial assistance. Pre-financing costs incurred in April, to be recovered at time of purchase could be an effective way to improve loyalty. Especially when SASL scales up and requires pineapple farmers to invest in organic farming and increasing the farm size.

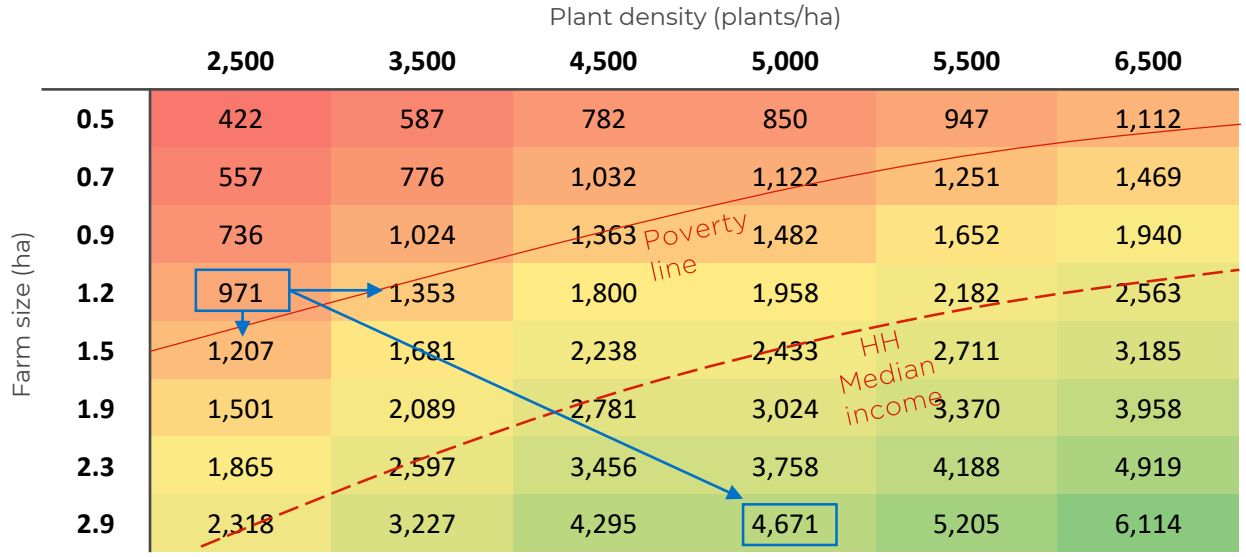
Coconut

With no commercial value chain in place yet, most coconut farmers are not incentivized to invest in their farms. Their main cost is harvesting, as it requires tools or professional harvesters. SASL is already addressing this challenge by providing harvesting as a service.

To scale up commercially, aggressively expanding area under coconut cultivation SASL would need to provide long-term financial support to farmers overcome their initial investment explored in various scenarios here.

Sensitivity analysis: Pineapple farming

Pineapple income for North and South segment ($/year)
For combinations of farm-size (ha) and plant density (plants/ha)



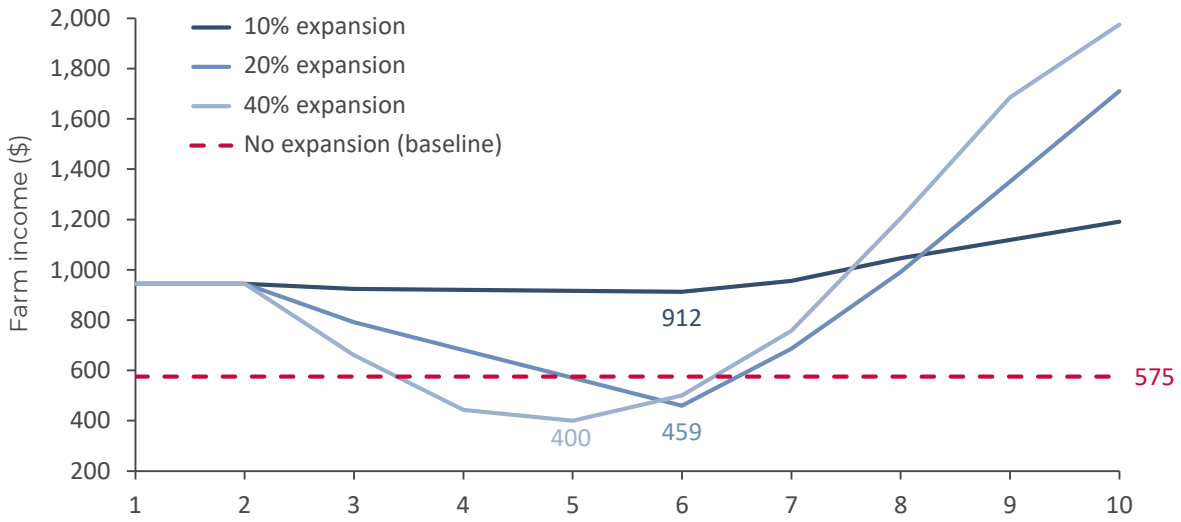
Farm size (ha) \ Plant density (plants/ha)	2,500	3,500	4,500	5,000	5,500	6,500
0.5	422	587	782	850	947	1,112
0.7	557	776	1,032	1,122	1,251	1,469
0.9	736	1,024	1,363	1,482	1,652	1,940
1.2	971	1,353	1,800	1,958	2,182	2,563
1.5	1,207	1,681	2,238	2,433	2,711	3,185
1.9	1,501	2,089	2,781	3,024	3,370	3,958
2.3	1,865	2,597	3,456	3,758	4,188	4,919
2.9	2,318	3,227	4,295	4,671	5,205	6,114

Pineapple expansion

- The North and South pineapple farmer segment is expected to (driven by increase in demand from local market and SASL) increase average farm size from 1.2 ha to 2.9 ha and average plant density from 2,500 to 5,000 plants/ha. As these changes have not been materialized and are key farming income drivers, their impact on incomes is assessed. Under the current, optimistic assumptions, farmers are projected to raise incomes from $971/year to 4,671/year. However, if farmers are not able to expand because of land scarcity or plants more pineapples due to lacking supply of suckers, the actual results may vary significantly.
- At the same time farm size growth and plant density growth can be also seen as high impact growth levers for farmer income. E.g. currently the South & North farmers are just below the poverty. This means that, as soon as SASL is able to drive the plant density up by another 800-1000 plants/ha or increase the farm size by 20-25%, the farmers will grow beyond the poverty line.

Scenario analysis: Coconut farming

Projected coconut farming income ($) at different rates of farm expansion



Rate of farm expansion	10%	20%	25%	30%	40%	50%
Cumulative income increase vs baseline	4,125	3,285	3,381	3,525	3,766	3,984
Average income	987	904	913	928	952	973
Minimum income	912	610	459	455	400	83

Coconut expansion

- Once planted, a coconut tree takes ~4 to 7 years to start producing nuts, making farm expansion a significant investment (one-time costs as well as recurring maintenance costs, especially composting).
- Coconut farmers in Sierra Leone are investing minimally in coconut farming and have no incentive to expand their coconut farms, given the oversupply in the market. But, if SASL decides to scale-up its coconut operation and initiates the strategic sourcing (incl. plantation of short verities) from Strategic segment, it may lead to significant cashflow challenges for the strategic segment farmers, depending upon the farm expansion rates demanded by SASL.
- The annual farming cashflow is very sensitive to the rate of farm expansion. Very aggressive expansion (e.g. 25% to 50% per year), will result in a bigger dip in the annual cashflow, occurring early in the timeline, but would enable the farmers to reap the benefits of additional revenues early too. Such aggressive expansion may be relevant if SASL intends to scale-up fast and ensure the reliability of supply by sourcing majorly from Strategic segment. In that case, farmers will need to be provided with financial support to manage the cashflow dip.
- On the other hand, if SASL decides to pursue a slow scale-up, then a farm expansion rate of 10% or less may suffice. This would avoid a dip in the cashflow, but would also delay the improvement in farm incomes.
- The potential returns for farmers from an investment in farm expansion are contingent on security of future offtake. Unless SASL formally commits offtake, this investment is extremely risky from farmers' perspective because the market is already over supplied.

Financial analysis overall SDM

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

In this section you will:

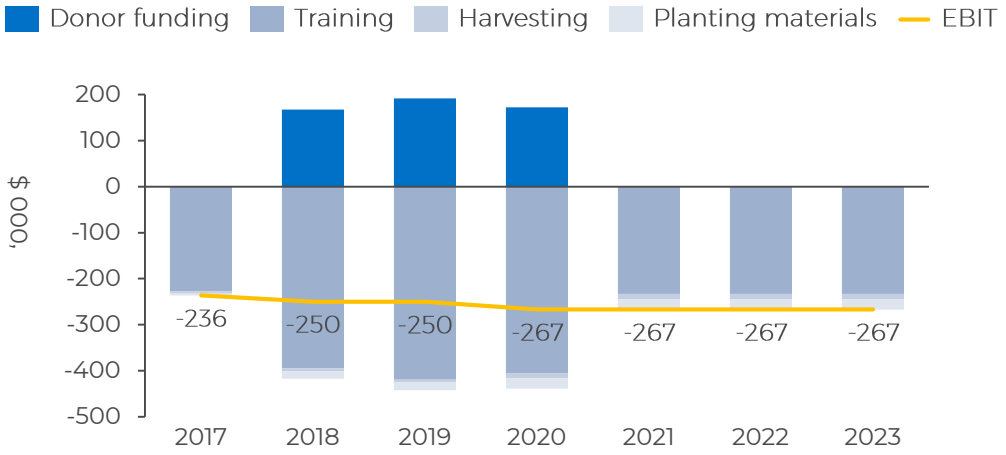
- ✓ Understand the financial performance of the SDM
- ✓ Get an insight of the different sources and founders of the SDM
- ✓ Find an overview of the financing KPIs

Go to Key Assumptions

SDM P&L - services

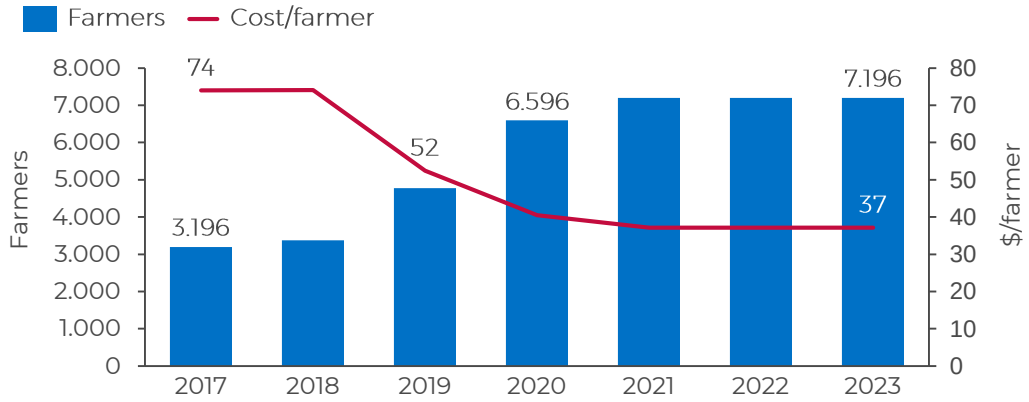
SDM revenues and expenses

In '000 $ per year, by activity



Scale and operational efficiency

Number of farmers and service costs per farmer



SDM sustainability

- The combined service provision activities of SASL are loss-making, peaking and staying stable at around $267,000 from 2020 onward. This is to be expected as SASL, being a trader first, envisions to recoup most costs through larger sales volumes and increased margins (see next slide).
- There is no strategy around recovering service costs through direct payments; i.e. all services are provided to farmers free of charge. Charging for services is a challenge: most farmers are used to getting NGO support for free and/or have no resources; others are only loyal to those traders providing them with free services.

Service revenues

- W&D and IDH jointly fund training between 2018 and 2020. Activities covered are GAP training, clustering of farmers, training of JULA trainers and the implementation of a Management Information System.
- There are no service revenues projected. All trainings, inputs (suckers) and equipment (tarpaulins, tools for harvesting teams) are provided for free.

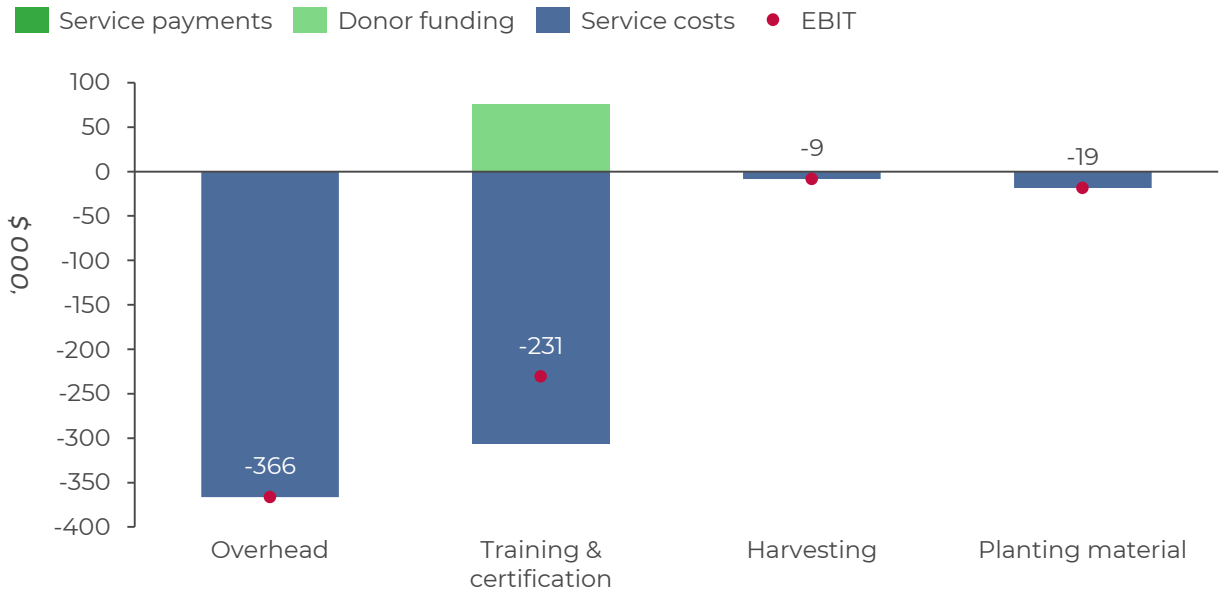
Service expenses

- Annual salaries of field staff are the main expenses (67% of total) amounting to $225,000. Salaries for staff overseeing the harvesting support add another $9,000 per year. As the SDM scales, no new hires are expected to be necessary as additional work replaces current idle time.
- Certification fees for Organic standards cost $8,000 yearly.
- Around $2,000 per year is projected to cover for the provision of 186 tarpaulins and pay for 24 coconut harvesting teams.
- Production of pineapple suckers costs at around $22,000 per year, including labor (3 full-time farmers), inputs and irrigation depreciation and running cost.

Overview of service profitability

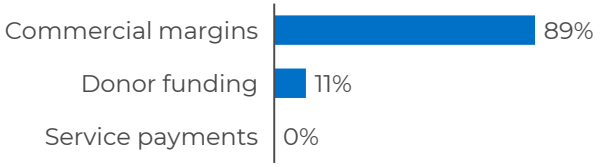
Service profitability

Annual revenues and expenses, '000 $, average over 2017-2023



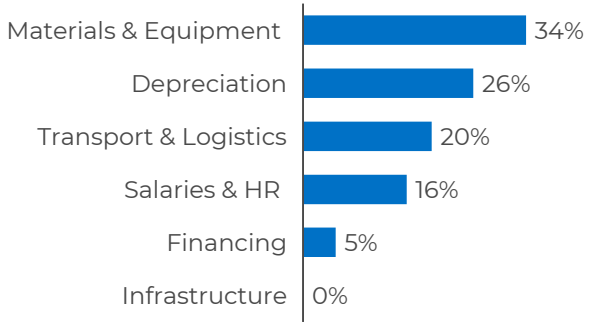
Share of expenses covered by source [1)]

% of service costs, total of 2017-2023



Share of expenses by type of cost

% of service costs, total of 2017-2023



Service sustainability

- Not taking into account commercial revenues, all services operate at a loss. As mentioned before, depending on the farmer segment, there are different reasons why it would be difficult for SASL to charge for their services.
- More profitable and impactful would be for SASL to invest in expanding processing facilities and scaling up sourcing volumes (as explored here).
- Still, if SASL seeks to become more self-sufficient as a service provider, it needs to design payment schemes for its products and services.
  - **Training & certification** should mainly be recovered through increased sourcing volume and quality per farmer (due to GAP) and larger margins (selling organic produce for a premium). Profitability is not assessed here.
  - **Harvesting**: while currently harvesting teams are paid by SASL, it would be interesting to have harvesters become independent, charging margins on their services to recoup their equipment expenses. As relationships with communities strengthen and farmers better understand they have to invest in their businesses, SASL can start charging for tarpaulins to cover the cost.
  - **Planting materials**: given the target sourcing volumes for pineapple, it makes sense suckers are currently provided for free. As pineapple supply expands, SASL could start charging for its suckers (e.g. from 2022 onward), especially as it is able to provide better quality, higher yielding varieties.

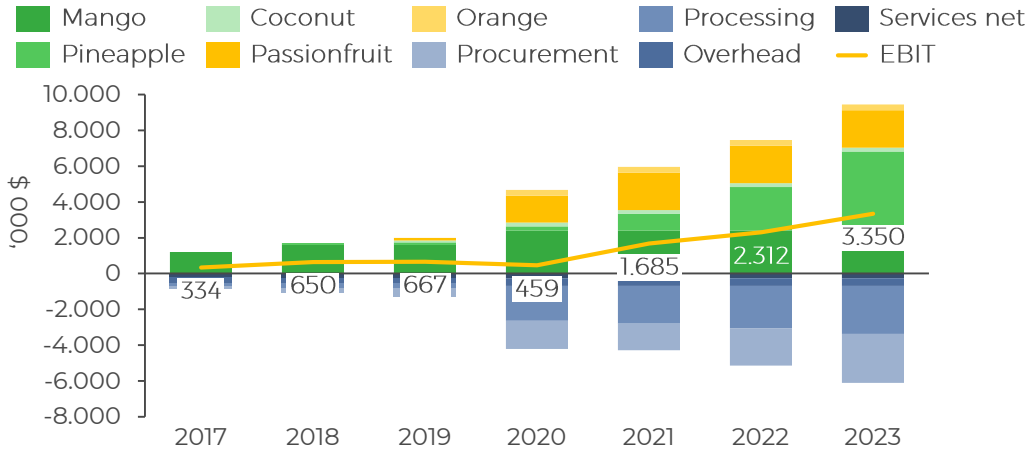
1) Revenue sources as defined in the SDM methodology; in this case, assuming the SDM is profitable (see next slide), the commercial margins cover all service costs not covered by donor funding and service payments

Go to Key Assumptions

SDM P&L - commercial

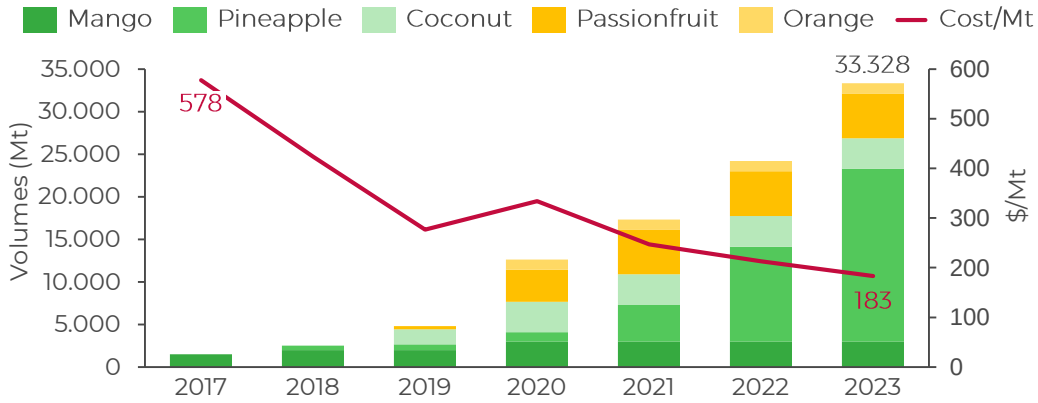
SDM revenues and expenses

In '000 $ per year, by activity



Scale and operational efficiency

Sourcing volumes by crop and costs per Mt sourced



SDM commercial sustainability

- Already running a profitable mango business from 2017 onwards, EBIT is expected to grow to $3,350,000 by year 2023.
- The dip in 2020 is a result of necessary investments in processing capacity and infrastructure, while sourcing volumes of other crops are still small.

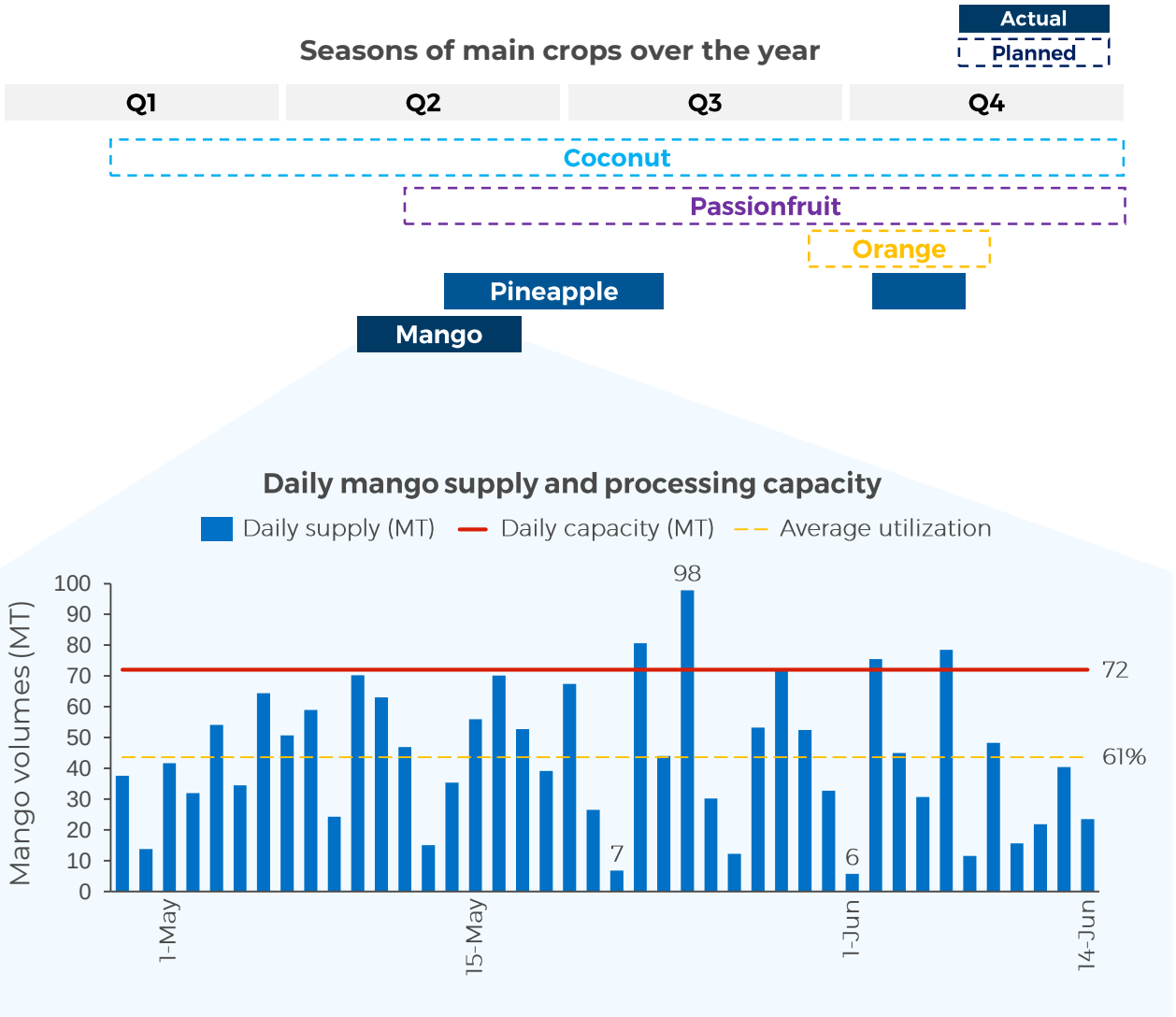
Commercial revenues

- Growth in profitability is driven by the increase in pineapple volumes (from 500 MT/year in 2018 to 20,000 MT/year by 2023) and the expansion into coconut (3,600 MT/year), passionfruit (5,250 MT/year) and orange (1,200 MT/year).
- While mango accounts for only 9% of volumes by 2023, it contributes to 44% of gross profit. Pineapple constitutes to 61% and 24% respectively. This is due to the high profitability of mango compared to other fruits. Coconut, under current assumptions is loss-making. Assumptions need to be tested and refined while costs should be brought down where possible.

Commercial expenses

- In order to reach and sustain this scale of operations SASL needs to invest in its own plantations, processing capacity and expand the management team (i.e. agronomist, operational manager, marketing director).
- While headcount is supposed to expand over time, overhead as percentage of total costs is brought down from 34% ($291,000) in 2017 to 7% ($422,400) by 2023.
- SASL greatly improves sourcing efficiency as it scales up and increasingly sources from its own plantations (76% in volume and 52% in value by 2023).
- Processing expenses, included here as annual depreciation of around $2,000,000 annually, are indicative. SASL would need to strategize on the rollout of various investments (dehydration equipment, ripening chambers, etc.), by getting more accurate information on additional capacity and costs and prioritizing investments based on crop gross margins and volumes.

Recognizing current processing constraints



Low utilization throughout the year

- The mango season runs from end of April to mid June, amounting to around 60 days. Pineapple is harvested from end of May until end of July, with another 30 days around November, totaling roughly 90 days per year. Coconut can be sourced and processed for 300 days throughout the year.
- With mango and pineapple seasons overlapping and coconut not yet processed the current processing line is operational at around only 80 days per year.

Low utilization during mango season

- Early in the mango season, daily volumes are not enough to have the processing line run at full capacity. Roughly from May 6th onward mango is abundant. Still, during the season, the line runs at only 61% capacity on average.
- The main cause of underutilization is the frequent breakdowns of the machines. When this happens the buying teams are informed not to buy and deliver mango the next day. This can be seen from the low volumes brought in on May 21st and June 1st. On May 18th only half the line's capacity is supplied as leftovers of the day before are still being processed due to minor machine failures.
- Another cause is the breaking down of trucks as a results of long distances, poor road conditions during heavy rains and the state of the vehicles. While drivers are contracted, they are liable only to a certain extent. SASL can not expense incurred losses from low utilization to those drivers.

Opportunity pathways to improve utilization

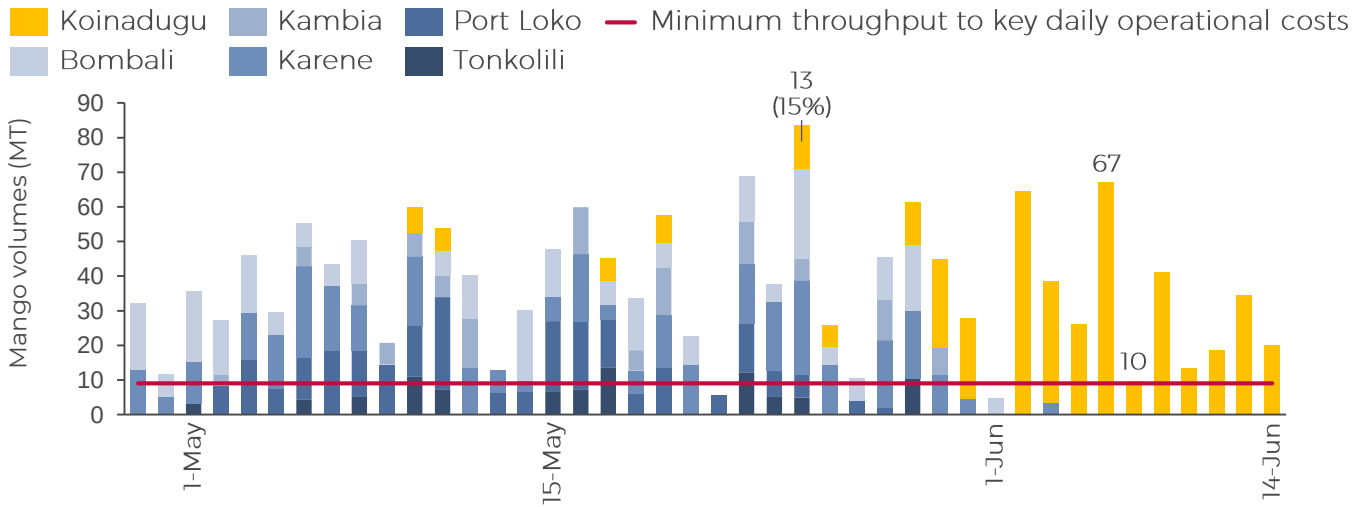
SASL's priority in growing the business and generating farm-level value is to increase sourcing volumes. Below investments are the key opportunities to invest in to either expand capacity and/or improve utilization to be able manage the growing supply.

	Pathway	Rationale	Status
1.	**Distant mango sourcing**	• The mangoes grown in Koinadugu district ripen later in the season and can hence be processed during otherwise idle days. • While extending the mango season, it overlaps with pineapple being supplied and processed (seen next pathway).	Already on-going Assessed on next slide
2.	**Other crops (pineapple, coconut)**	• With only slight modifications the same processing line can be used for pineapple and coconut, and later passionfruit and orange. • With pineapple only partly overlapping the mango season and coconut being harvested throughout the year (300 days) the machines can be used during otherwise idle days.	Started, scaling up Assessed as part of P&L
3.	**Repair current processing line**	• Due to regular breakdown during the season, the within season utilization rate is only at 61%, while a rate of 80% should be feasible. • Repairing the current line and making sure future breakdowns can be repaired relatively quickly (e.g. having an on-site mechanic and spare parts readily available) will reduce down days and improves the utilization rate	Unclear
4.	**Invest in refrigerator**	• Refrigeration allows storing fresh fruits to be processed later (after peak days; on client demand).	More research needed
5.	**Invest in IQF (Individual quick Freezing)**	• Cold storage allows freezing fruits to be sold as frozen fruit chunks. • For mango this would be an immediate opportunity as there is still a large untapped supply base.	
6.	**Invest in dehydration**	• Dehydration allows drying fruits (at a decentralized location) to be sold as dried fruit chunks.	
7.	**Install new production line**	• Installing a new line will further expand processing capacity and allows processing to different fruits in parallel. • Only necessary as volumes are expected to greatly exceed currently installed processing capacity.	
8.	**Invest in ripening chamber**	• A ripening chamber allows quick ripening of early harvested mangoes, allowing processing even before the current start of the season.	

Distant mango sourcing

District	Distance (km)	Cost ($/MT)	Volumes sourced (MT)
Koinadugu	254	31.5	513
Karene	215	26.2	427
Bombali	198	22.4	343
Port Loko	106	13.5	302
Kambia	141	17.8	140
Tonkolili	125	13.1	107

Daily mango supply (Mt/day) by district

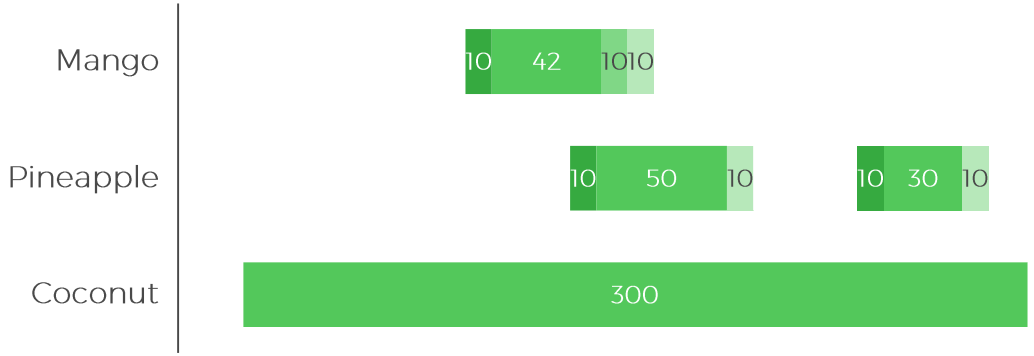


Importance of distant mango sourcing

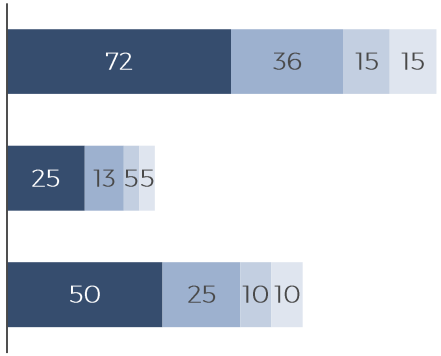
- While being the most distant district with highest variable costs (includes raw materials, fuel, transport and toll) Koinadugu has the highest share of mango sourced at 28% of total supply.
- Out of 42 days of mango season 9 days are used to only process Koindagu mangoes; during another 10 days this district supplies 34% of daily volumes processed.
- The average volume processed for those 9 unique days is 32.8 MT, well above the 9 MT minimum volume required to cover daily operational costs of labor, meals and fuel.
- Without sourcing from Koinadugu, average daily utilization would drop from 61% to 37%.

Expanding processing capacity

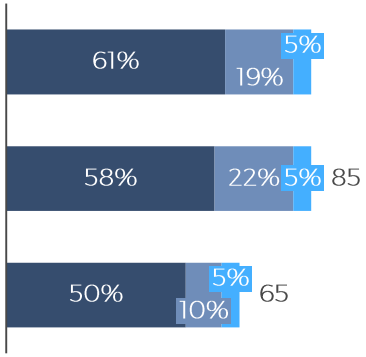
Crop season (processing days)
Current and potential number of day and timing of season by fruit



Daily processing capacity
Current and potential MT/day processed per by fruit



Utilization (in-season)
Current and potential average utilization by fruit



Potential for expanding processing capacity and subsequent regional development

- Each investment (see legend to the right, explained on slide 44) improves the processing capacity in different ways. For example ripening chambers can add 10 days at the start of the mango and pineapple season (left graph); installing a new smaller line can increase daily processing capacity with 36 Mt mango per day extra (middle graph); and/or repairing the current line can improve daily utilization from 61% to 19% (right graph).
- Already SASL is expanding into sourcing pineapple and coconut improving the utilization of their machines over the year (see right graph). Under optimal conditions this means (assuming mango is prioritized over pineapple, which is prioritized over coconut because of higher margins) machines are processing mango, pineapple and coconut for 62, 90, and 148 days respectively.
- Given certain assumptions on additional capacity (see Key Assumptions), and mango, pineapple and coconut supply is sufficient to meet demand, the total additional processing capacity (and subsequent value generated at farm level) can be estimated. Several scenarios are explored on the next slide.

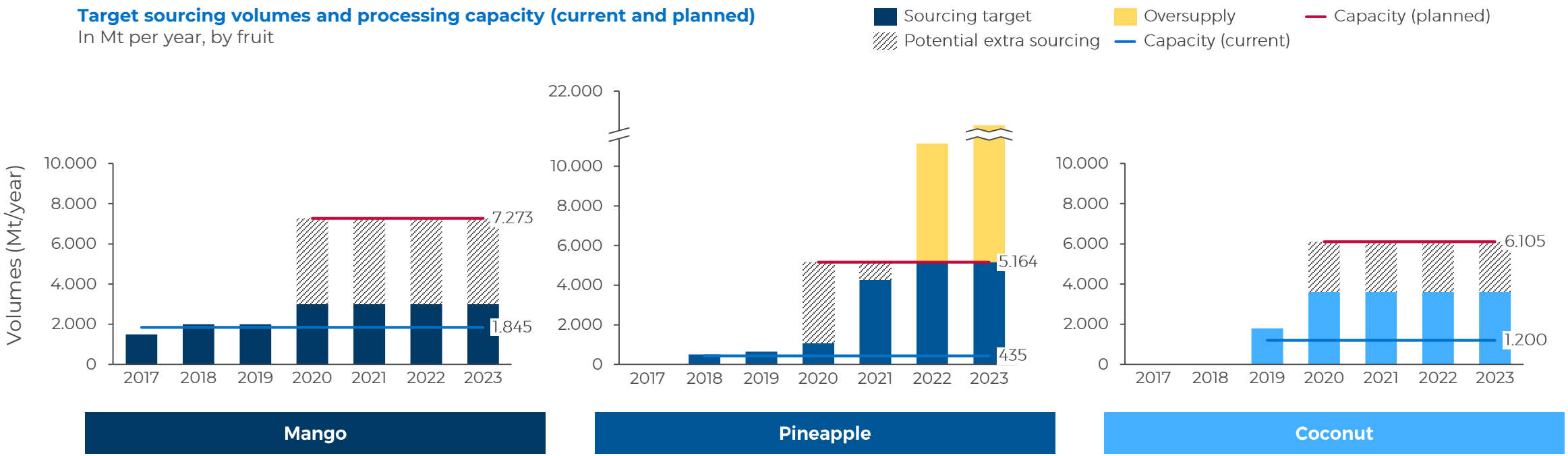
Impact per processing investment:

- Current line
- Repair current line
- New line
- IQF Blast freezer
- Dehydration chambers
- Ripening chambers
- Season as is
- Distant sourcing
- Cold storage

Go to Key Assumptions

Sourcing targets and processing capacity

Target sourcing volumes and processing capacity (current and planned)
In Mt per year, by fruit



Optimizing capacity

- Processing capacity will be significantly expanded (see assumptions on previous slide) to handle increased sourcing volumes of mango, pineapple and coconut, but is not yet optimized.
- Mango and coconut sourcing volumes can be increased, while for pineapple[1)] it needs to be adjusted downwards.
- Alternatively, processing days can be allocated differently, to process relatively more pineapple to mango.
- However, under current assumptions, gross margins for mango are highest, favoring processing mango over pineapple and coconut.

Limitations

- Above analysis is indicative as it is based on a wide range of assumptions that need to be retrieved from either manufacturers (for processing equipment) or tested in the field (gross margins).
- Only if accuracy has been improved can decisions be made about prioritization of investments (which combination of equipment; timing of investments) and best allocation of processing capacity across the crops.
- The key drivers to consider in future are the costs of equipment per unit of capacity increase, gross margins per crop and feasibility (e.g. availability of equipment and/or market for product).

1) Includes production from own plantation

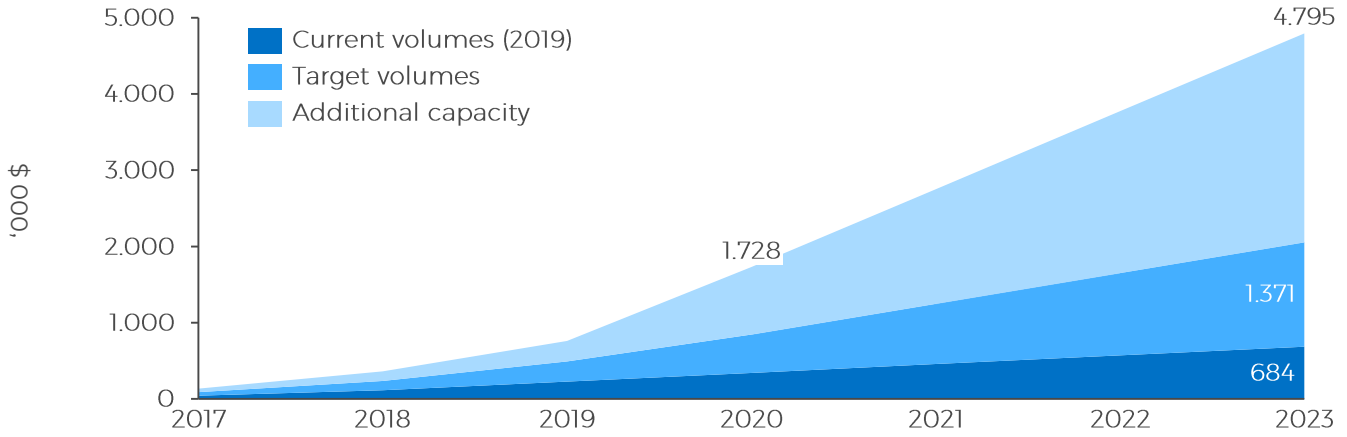
Total value generated at farm level

Assessing three sourcing scenarios

- Three scenarios of total value generated (farm-gate price times volumes per year) have been estimated:
  1) assuming current capacity constraints sourcing volumes at 2019 levels;
  2) assuming target volumes as set by SASL can be processed accordingly; and
  3) assuming processing capacity is expanded beyond sourcing targets based on assumptions as outlined in previous slides.
- Total value generated per scenario is as follows:
  1) A total (2017-2023) farm value of $700,000 is generated if volumes stay at current levels
  2) Another $700,000 is added as SASL manages to scale up production in line with their production and install the necessary processing capacity.
  3) Further expanding capacity can add another $2,700,000

Obviously, the projection assumes all the other variables to stay constant, including the market price of the products produced.

Total farm value generated
'000 $ per year, all farmers



Conclusions

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

In this section you will:

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

Reflection on SDM Objectives

These results do not represent an official assessment of SDM success or failure by IDH or NewForesight. An indication is given based on the analysis done in this forward-looking study and assumptions provided by the SDM operator(s). Actual assessment should be done during and after the SDM, using measured data

CORE OBJECTIVES

1 Run a sustainable mixed fruit juices company in Sierra Leone

- SASL is projected to make an annual EBIT of $3.4 million by 2023, while generating a total value at farm-level of $1.4 million by 2023. Both are driven by sourcing volumes and processing capacity.
- Key to this profitability and impact is a capable management team; backed up by the right investors and strategic partners; abundant supply of fruits and limited competition.
- The main risk is the limited clarity about processing expansion capacity and costs necessary to process the growing volumes efficiently.

SECONDARY OBJECTIVES

2 Secure and grow supply of sustainable fruits, especially mango, pineapple and coconut

- SASL is expected to increase total sourcing volumes from 1,500 MT mango in 2017 to 33,300 MT fruits (mango, pineapple, coconut, passion fruit, orange) by 2023 (68% y-o-y growth).
- To process these growing volumes, SASL will need to install additional fruit juice processing capacity while expanding into new final product lines like frozen fruit chunks and dried fruits.
- Supply is secured by being the sole offtaker buying in bulk (mango, coconut), building relationships with communities via SASL field staff and free services (mango, pineapple, coconut) and managing own plantations (pineapple, passionfruit).

3 Improve incomes and livelihoods of smallholder farmers and their families

- By sourcing growing volumes of mango, pineapple and coconut from subsistence farmers, SASL is able to significantly boost their incomes and generate value across the country,
- Not taking into account other household income, farmers see the gap to poverty decreasing from around 85% to 70% (mango), 92% to 64% (pineapple East) and 92-66% to 70-51% (coconut). North & South pineapple farmers already earn well above the poverty line.
- Connecting farmers to export markets is by far the biggest impact driver. Expanding pineapple and coconut farms by providing planting materials is the most impactful service.

4 Support the local ecosystem (health service and logistical support for NGOs)

- Assessing the total impact SASL has on the local ecosystem (beyond farmer incomes, gender equity, and environmental resilience) is out of scope of the SDM analyses and hence not assessed.

Key opportunities and risks

Key opportunities

- **Global demand** for mixed juices (fruit and fruit-vegetables) is growing.
- **Growing domestic demand** for juices is not satisfied yet locally.
- **Raw materials** for a wide variety of fruits and (later) vegetables are abundant, allowing relatively easy scale up of mango volumes and expansion into other fruits and vegetables.
- **Limited competition** from other fruit offtakers and/or processors currently exists in Sierra Leone establishing a relatively strong market position for SASL.
- Most fruits are currently mainly grown **organic by default** enabling SASL to market and sell organic juices.
- SASL processing facility and plantations are located in the **Economic Freezone** close to Freetown.

Key risks

- **Poor infrastructure** in combination with heavy rainfall leads to high transportation costs and underutilization of the processing lines as trucks breakdown and do not deliver raw materials in time.
- Relatively untapped supply of organic fruits and vegetables available in abundance **may attract competitors to market** and intensify competition for raw materials.
- **Changing weather patterns** affected fruit harvests this year as rains came in later than expected. Further deviations.
- **Pests and disease** are a consistent risk to crop yields and quality, especially with increased seasonal variability and most farmers growing crops organically.
- **A growing chemicals industry** to combat pests and diseases in Sierra Leone will make it more difficult and costly to guarantee fruits are grown and sourced organically.

Key strengths and improvement areas

Key Strengths

- **As a trader with a sustainability vision** SASL has gathered a close-knit network of diverse and eager partners and investors for technical support and funding. This would enable a larger pool of support and risk sharing as SASL moves towards potential scale-up.
- **The SASL team has strong ties** with both the international (buyers) and local community (government) to build sales and understanding of how to navigate the legal and business environment in Sierra Leone.
- **SASL has a capable implementation team** in place necessary to manage, scale up and improve the current operations in factory and field. This lowers potential operational risks. E.g. SASL supply chain team understands how to build strong, long-term relationships with mango farmers, enabling SASL to scale up mango volumes (given sufficient processing capacity) and expand sourcing operations into other crops and farming communities.

Improvement areas

- **SASL can become more efficient** by improving utilization of the processing line. Current challenges are:
  - Limited processing capacity in combination with perishable fruits,
  - Breakdowns of processing line without in-house adequate expertise to repair breakdowns, and
  - Breakdowns of trucks without accountable supplier.
- SASL could **improve alignment between strategy and implementation** with a) effective communication and sharing between senior management and operations team, and b) establishing mechanisms for continuous monitoring and evaluation of strategy implementation.
- **Limited capacity on key business positions**, which places additional pressure on implementation team. SASL would need to recruit an agronomist to expand into other crops and improve services provision; a technician to oversee the processing lines and improve utilization and a sales director to further expand the business.
- **Infrastructural constraints**: the SASL processing line is not connected to the grid, relying heavily on fuel-based generators.

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Annex

In this section you will find information on:

- ✓ The enabling environment
- ✓ Gender equity and environmental resilience
- ✓ Key Performance Indicators
- ✓ Glossary
- ✓ Key assumptions

Opportunities and challenges in the enabling environment

Impact of environment on SDM
-5: very negative impact
+5: very positive impact

	Definition	Key Challenges	Impact
Governance	**LAND OWNERSHIP** Existence of land ownership rights / regulations and their enforcement. Ease of purchasing/ transferring land	Land ownership laws, regulations and enforcement are still at nascent stage. Enactment of National Land Policy in 2017 is a step in a positive direction.	▼ -1
	INFRASTRUCTURE Existence and state of roads, water and electricity networks as well as proximity to main trading / processing hubs (e.g. access to market)	Lack of access to electricity and road network are major hindrances for development of agro supply chain. Except for local market, there are no large regional markets or processing hubs.	▼ -4
Farm Inputs	**LABOR** Cultural norms that restrict /promote people of certain ages, genders or social groups from farm labor. Availability and cost of labor	Unskilled or semi-skilled labor is abundantly available. Highly skilled labor such as agronomists, machine mechanics are difficult to find.	▼ -3
	INPUTS & FINANCING Availability of affordable, quality inputs and the necessary marketing and distribution mechanisms. Availability of credit. Enabling regulatory environment	Farming being organic by default doesn't require chemical fertilizers or pesticides. Farm equipment and other tools are not available in nearest towns. Limited credit availability.	▼ -3
Crop	**TRADING SYSTEM** Organization of the system through which crops are traded from farmer to market, including the number and type of actors involved	Local demand for pineapple is strong resulting in large number of traders and buyers dealing in it; Mango and coconut supply exceed local demand resulting in weak trading markets.	▼ -3
	PRICING & COMPETITIVENESS Market dynamics of the main crop of the SDM, including competition between buyers and possible price-setting by the government or other parties	Mango pricing is determined by Sierra Agra (only organized buyer in market) and small traders. Pineapple market is competitive with many buyers and market determined price.	▼ -4
Sustainability	**ENVIRONMENTAL CONTEXT** Climate change, possibility of extreme weather, soil type, water supply and quality, pests and diseases. Potential environmental damages such as deforestation	Very minimal or non-existent usage of agrochemicals. No widespread or recurring crop diseases. Insects and grasshoppers result in some production loss Deforestation for pineapple cultivation is a risk.	Neutral
	SOCIAL CONTEXT Availability and quality of schooling / healthcare. Cultural factors. Potential social externalities like child labor, gender disparity	Access to basic schooling in farming villages. Very limited access to modern healthcare.	▼ -2

Gender equity in Sierra Leone

Enabling environment

The Sierra Leone environment is not equitable. Regarding education, more women have access it when they are children. However, they don't have equal ownership of a banking or mobile money service. For the most part, Sierra Leonean women have little power to make household decisions on their own.

	Gender ratio (Female / Male)[1]
Primary education enrollment *[1]	1.01
Owner of a bank account or used a mobile money service in the past year *[2]	0.62
% of married women who participate in decision-making **[3]	44%

Legend: Men; Women; National average; Gender ratio (Female / Male)[1]

Comparison of Sierra Agra to the national context

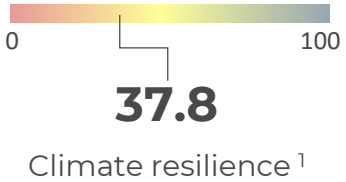
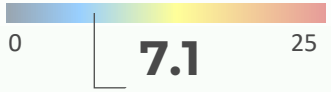
Very limited gender specific data is available for Sierra Leone. For example, it has only ben included in the last version of the Global Gender Gap report. Yields split by gender cannot be obtained.
According to SASL 90% of their mango farmers are female. FAO states that 20.7% of rural households are female headed. Another article mentions on average 30% of women are active in mango farming versus 70% of men. Lack of knowledge about mango farming, labor intensity and the tradition stating women's role is to take care of children and the household, explains the lower participation.

	Sierra Leone	SDM
How does Sierra Agra's ratio of female to male employees compare with the country labor force participation? *[1]	0.99	0.XX
How does Sierra Agra's proportion of female to male farmers compare with the country-wide farmer distribution? [5]	30% / 70% (2018)	90% / 10% (2018)
How do the incomes earned by Sierra Agra's employees compare with the incomes earned by women and men in the country? *[1]	0.72	n/a
How does the yield (kg/ha) Sierra Agra's male and female farmers compare with the country average? [4]	No data available	

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

Sources: **1)** World Economic Forum (2016): Global Gender Gap report; **2)** World Bank (2017): Global Findex; **3)** USAID (2016): Demographic and Health Survey; **4)** FAO (2018): Global Crop Database **5)** Value Chain Development for Mango (2017)

Environmental resilience of farmers in the SDM

	Indicator	Discussion	SDM Risks & opportunities
Climate resilience	 Climate resilience [1]	Sierra Leone is assessed to be low in climate resilience. While they have high vulnerability to climate change (56%), there is low ability to leverage investments and convert them to adaptation actions (31%).	• Changing climate & temperatures can affect productivity and increase the chances of pest & diseases. • Crop diversification is an opportunity for farmers to increase their overall climate resilience.
Soil	**Moderate deterioration** [2]	The terrain bas greatly reduced agricultural productivity hut is still suitable for use in local farming systems. Major improvements are required to restore productivity. Original biotic functions are partially destroyed.	• Soil organic matter management (e.g. sustainable organic fertilizer application) can help increase the quality of the structure of the soil and reduce erosion.
Water	**Low risk** [3]	Sierra Leone has a low to medium overall water risk. While baseline water stress is low, seasonal variability is high and there is a high percentage of the population without access to improved drinking water supplies.	• Sustainable water management practices and smart irrigation systems are an opportunity for farmers in the region to reduce their water consumption and preserve local water resources.
Agro-ecoystem	 Human footprint [4]	Sierra Leone has a medium environmental footprint. Since 1993, the country has seen a decrease in environmental impact	• Intensive agricultural practices and urban sprawl are a threat to natural land and local biodiversity • By adopting agroforestry practices, mango farms contribute to local agricultural biodiversity.

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

Key assumptions for farmer analytics

Key drivers	Unit	1	2	3	4	5	6	7	8	9	10
Farm size											
Mango: all	Acre/farm	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Pineapple: East	Acre/farm	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Pineapple: North & South	Acre/farm	3.00	3.30	3.63	3.99	4.39	4.83	5.31	5.85	6.43	7.07
Coconut: Average	Acre/farm	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Coconut: Strategic	Acre/farm	1.00	1.00	1.40	1.80	2.00	2.00	2.00	2.00	2.00	2.00
Planting density											
Mango	Trees/acre	20	20	20	20	20	20	20	20	20	20
Pineapple: East	Plants/acre	2,000	2,000	2,000	2,400	2,800	3,200	3,600	4,000	4,000	4,000
Pineapple: North & South	Plants/acre	2,000	2,500	2,500	3,000	3,500	4,000	4,500	5,000	5,000	5,000
Coconut: Average	Trees/acre	50	50	50	50	50	50	50	50	50	50
Coconut: Strategic	Trees/acre	50	50	50	50	50	50	50	50	50	50
Yield curve: since year of planting											
Mango	% of peak	0%	0%	0%	0%	10%	20%	40%	80%	90%	95%
Pineapple	% of peak	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Coconut	% of peak	0%	0%	0%	0%	33%	66%	100%	100%	100%	100%
Peak yield											
Mango	Kg/tree/year	540									
Pineapple: East	Kg/plant/year	0.90									
Pineapple: North & South	Kg/plant/year	0.81									
Coconut: Average	Kg/tree/year	288	*Assumes young coconuts from old trees*								
Coconut: Strategic	Kg/tree/year	320	*Assumes young coconuts from young trees*								

Go to services P&L

Key assumptions for SDM analytics - services

Key drivers	Unit	2017	2018	2019	2020	2021	2022	2023
Number of farmers								
Mango: Average	# of farmers	3,196	3,196	1,786	1,786	1,786	1,786	1,786
Mango: Advanced	# of farmers	0	0	1,410	1,410	1,410	1,410	1,410
Pineapple: East	# of farmers	0	180	330	900	1,500	1,500	1,500
Pineapple: North & South	# of farmers	0	0	0	0	0	0	0
Coconut: Average	# of farmers	0	0	1,250	2,500	2,500	2,500	2,500
Coconut: Strategic	# of farmers	0	0	0	0	0	0	0
Staff								
Overhead	Fte	3	3	3	3	3	3	3
Operational	Fte	2	2	2	5	5	5	5
Field	Fte	12	12	12	12	12	12	12
Training & certification								
Trainings per collection center	Trainings/year	1	1	5	5	5	5	5
Certification costs	Usd/year	8,000	8,000	8,000	8,000	8,000	8,000	8,000
Harvesting								
Tarpaulins provided	# of tarpaulins	136	142	147	166	186	186	186
Harvesting teams	# of teams	24	24	24	24	24	24	24
Planting materials								
Nursery land size (pineapple)	Acres	0	5	5	5	5	5	5
Production capacity	Suckers/year	0	0	245,000	245,000	245,000	245,000	245,000

SDM KPIs for 2017-2023

Farmer Economics

Productivity change (Year-on year growth starting from baseline productivity; increase of average annual SDM farmer from average annual baseline)	**Mango: 0% ; 0%** **Pineapple: +14% ; +51%** **Coconut: 0% ; 0%**
Profitability change (Year-on year growth starting from baseline profitability; increase of average annual SDM farmer from average annual baseline)	**+1.5% ; +7.0%**
Ratio of net income to poverty line* (SDM farmer ; baseline farmer)	**SDM: 1.27** **Baseline: 1.35**
Ratio of net income to median country income (SDM farmer ; baseline farmer)	**SDM: 0.13** **Baseline: 0.14**

These numbers are part of a pre-defined set of indicators which are calculated for SDM's across many countries and commodities. Compared to other SDMs, they can provide overarching insights into scale, efficiency, economic viability and corresponding best practises of SDM operation.

*Poverty line based on the World Bank international poverty line set at $1.90/day, adjusted for local purchase power parity (PPP) using the World Bank 2016 PPP conversion factor for private consumption

Sustainability

Average annual SDM net income, service payments only	**USD -3,400,000**
Average annual SDM net income, including donor funding	**USD -3,200,000**
Average annual SDM net income, including donor funding and commercial revenues	**USD 1.350,000**
SDM return on investment (including all revenues)	**41%**
SDM return on investment (service payment and commercial revenues)	**36%**
Revenues from service payments	**0%**
Revenues from donor funding	**4%**
Revenues from value chain investors	**0%**
Breakeven margin: baseline sourcing	**0%**
Breakeven margin: SDM sourcing	**311%**

SDM KPIs for 2017-2023

Efficiency*	
Average annual SDM expenses per farmer	**USD 540**
Average annual SDM net income per farmer	**USD 218**
Change in annual net loss per farmer (first to last year)	**+28%**
Annual net income per farmer (as % of value of total production; sourcing)	**11.8% ; 3.9%**
Baseline sourcing value per farmer	**USD 2,155**
Change in sourcing value per farmer (compound annual growth rate)	**+50%**
Annual SDM net income per MT sourced	**USD 36**
Change in sourcing efficiency (increase in SDM net income per MT sourced)	**+35%**
Loyalty rate (share of total farm production sold to case owner)	**35%**
Change in loyalty rate (first to last year)	**+5%**
Adoption rate (share of farmers that implement services provided)	**100%**
Change in adoption rate (first to last year)	**0%**

Gender	
Segmentation based on gender?	**No**
Number of female farmers in the SDM	**n/a**
Year-on-year growth rate of female farmers	**n/a**
Percentage of female staff employed (in the SDM; in UTT)	**n/a**
Percentage of female staff in leadership positions (in the SDM; in UTT)	**n/a**
Year-on-year growth female staff in leadership positions (in the SDM; in UTT)	**n/a**
Policy in place supporting women's empowerment?	**Yes**

These numbers are part of a pre-defined set of indicators which are calculated for SDM's across many countries and commodities. Compared to other SDMs, they can provide overarching insights into scale, efficiency, economic viability and corresponding best practises of SDM operation.

*KPIs averaged over all the farmers from all fruit value chains; the SDM costs and revenue values used for KPI evaluation include commercial revenues and costs

Glossary (1/2)

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

Glossary (2/2)

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