

# SDM: Case Report Sierra Agra

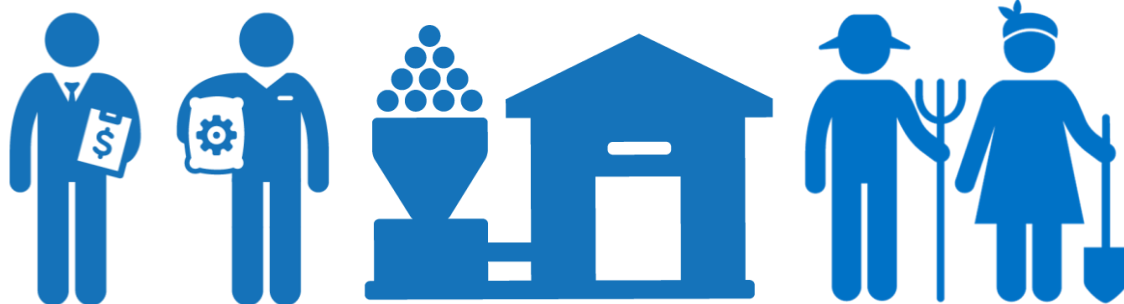
Service Delivery Model assessment: short version

November 2019

Location: Sierra Leone

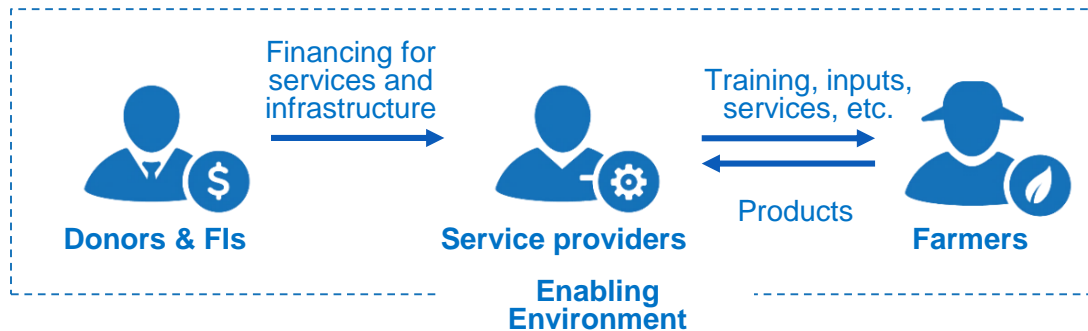
Commodity: Mango; pineapple; coconut

Services: Training; harvesting support; planting material; access to markets



# What are SDMs and why are we interested in analyzing them?

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



By analyzing SDMs, we aim to support **efficient, cost-effective and economically sustainable SDMs at scale** through:

Key drivers for success of SDMs benchmarking



Innovation opportunities to support



Cross-sector learning, learning community



Convening at sector and national level



## Analyzing SDMs brings a range of benefits



### Farmers and farmer organizations

- **Better services** improve productivity, product quality, quality of life and social and environmental outcomes
- **Better outcomes:** improved productivity, income and resilience



### SDM operator

- **Understand** your model's business case
- Gain insights to **improve** service delivery
- Develop **cost-effective** SDMs based on insights
- Identify opportunities for **innovation** and **access to finance**
- **Learn** from other public and private SDM operators operating across sectors/geographies
- **Communicate** stories of impact and success at farmer level



### Investors/FIs

- **Common language** to make better informed investment decisions
- Insights to achieve optimal **impact, efficiency and sustainability** with investments and partnerships in SDMs

# The Sierra Agra SDM and objectives

## General SDM information:

Location:	Sierra Leone
Timing in analysis scope:	2019-2023
Scale (start of analysis):	3,196 farmers
Scale (end of analysis):	7,196 farmers
Funding:	Service provider, co-funded by IDH, Woord en Daad and Fair Match Support
SDM Archetype*:	Global



- Sierra Agra Sierra Leone (SASL) is an organic and fair-trade certified juice processing, and whole fruit sales & exporting company in Sierra Leone, West Africa. The company's core products are fruit concentrate juices and NFC (not from concentrate) juices.
- SASL operates a processing factory in a special economic zone outside of Freetown, and sources mangoes from 3,500 farmers (90% of whom are women) via 60 collection centers.
- SASL is Fair Trade and Organic certified and is a member of the Sustainable Juice Covenant –a global initiative for sustainable juice production.

\* For more info on SDM archetypes, see the [IDH Smallholder Engagement Report](#)

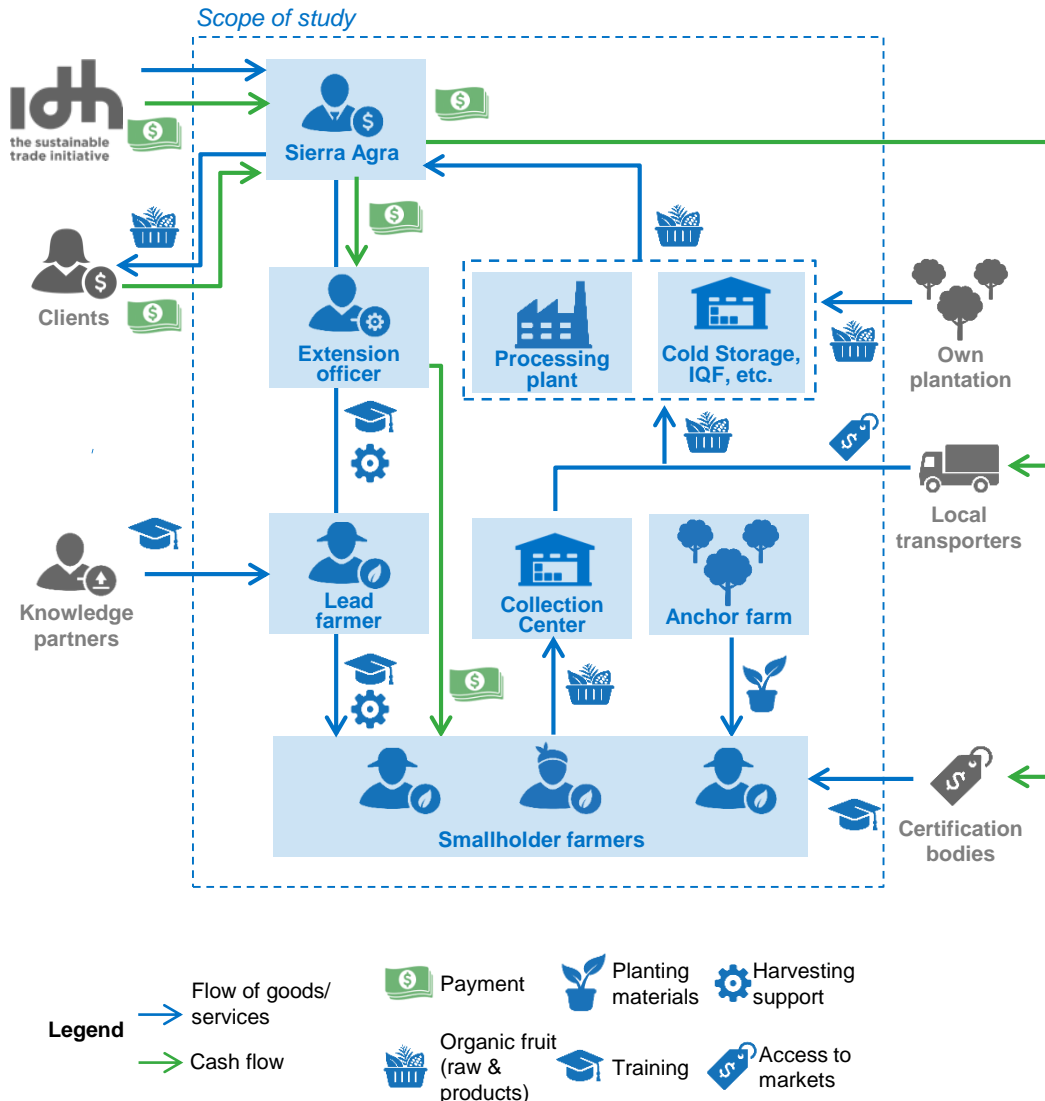
## SDM objectives:

- 1 Run a sustainable and inclusive mixed fruit juices company in Sierra Leone
- 2 Secure and grow supply of sustainable fruits, especially mango, pineapple and coconut
- 3 Improve incomes and livelihoods of smallholder farmers and their families
- 4 Support the local ecosystem (health services and logistics support for NGOs, taxable revenues)

## SDM rationale:



# SDM and structure and enabling environment



- 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 villages.
- SASL owns a juice processing plant and warehouse facility.
- SASL has entered into a partnership with a consortium of strategic partners to work on various aspects of the organic fruit juice supply chain.

## Enabling environment

Farmers are impacted by several factors within their enabling environment. Most important are:

### 1. Infrastructure

Lack of access to electricity and road network are major hindrances for the development of the agro supply chain. Except for local markets, there are no large regional markets or processing hubs.

### 2. Price and competitiveness

Mango pricing is determined by Sierra Agra (only organized buyer in the market) and small traders. Pineapple market is competitive with many buyers and market-determined price.

### 3. Labor

Unskilled or semi-skilled labor is abundantly available. Highly skilled labor such as agronomists and machine mechanics are difficult to find.

# Services delivered and farmer segmentation

**M** Mango  
**P** Pineapple  
**C** Coconut

## Farmer training

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

## Harvesting support

- M** 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.
- P**
- 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 sources in the region to provide them to those 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** For most – especially remote –
- C** 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.

## Farmers are segmented in this SDM:

For each crop sourced, SASL has (or plans to have) two distinct service packages.

### **M** Basic

- Access to markets: sell ~5% of produce to petty traders, and ~32% to SASL
- Willingness: less eager to adopt than Advanced

### **M** Advanced

- Access to markets: sell ~5% of produce to petty traders, and ~43% to SASL
- Willingness: more eager to adopt than Basic

### **P** East

- Access to markets: medium; struggle to sell the crop and receive lower prices
- Willingness: eager to adopt

### **P** South & North

- Access to markets: high; majority of produce sold to the local market
- Willingness: eager to adopt

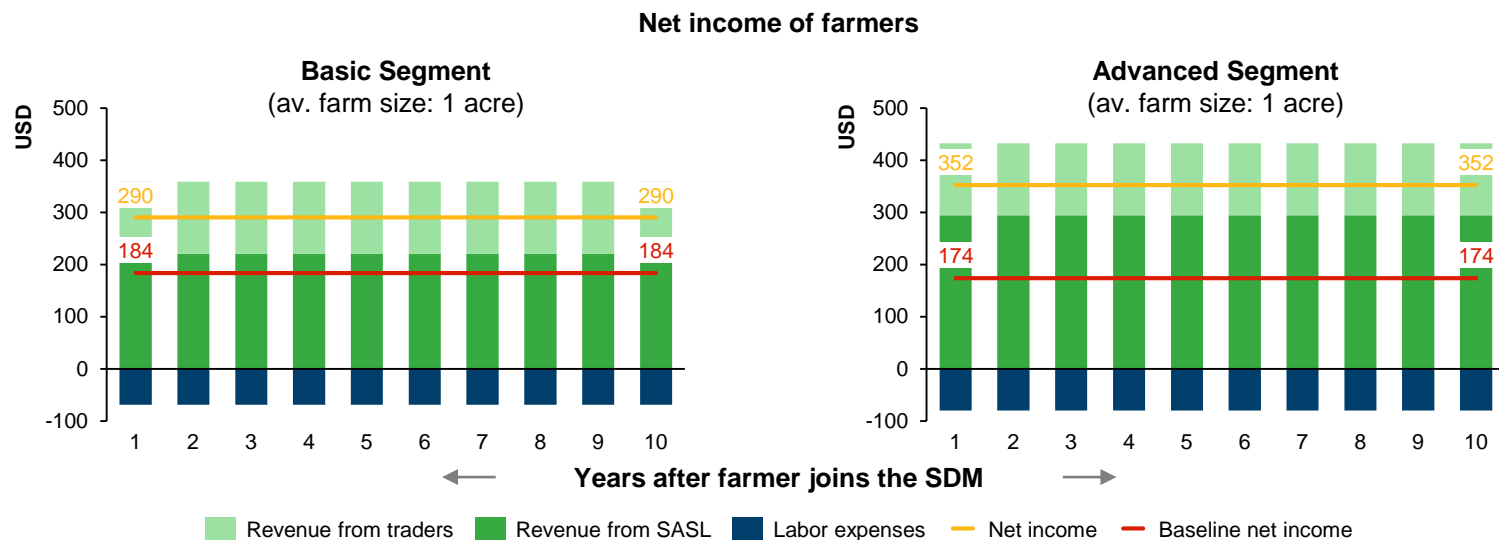
### **C** General

- Access to markets: low; located in difficult to access coastal regions
- Willingness: eager to adopt

### **C** Strategic

- Access to markets: medium; closer to capital, gets better access to market
- Willingness: eager to adopt

# Overall SDM impact: Mango farmer P&L



## Economic sustainability at farm level

Mango farmer's costs are very low and income from mango farms approximately contributes to 30% of household income of SDM farmers. Since this income comes without much effort or risk, farmers see this as bonus money bolstering their household income.

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.

Farmers are not motivated or incentivized to invest more in mango farmers unless current production is entirely sold at competitive prices.

## Main revenue drivers

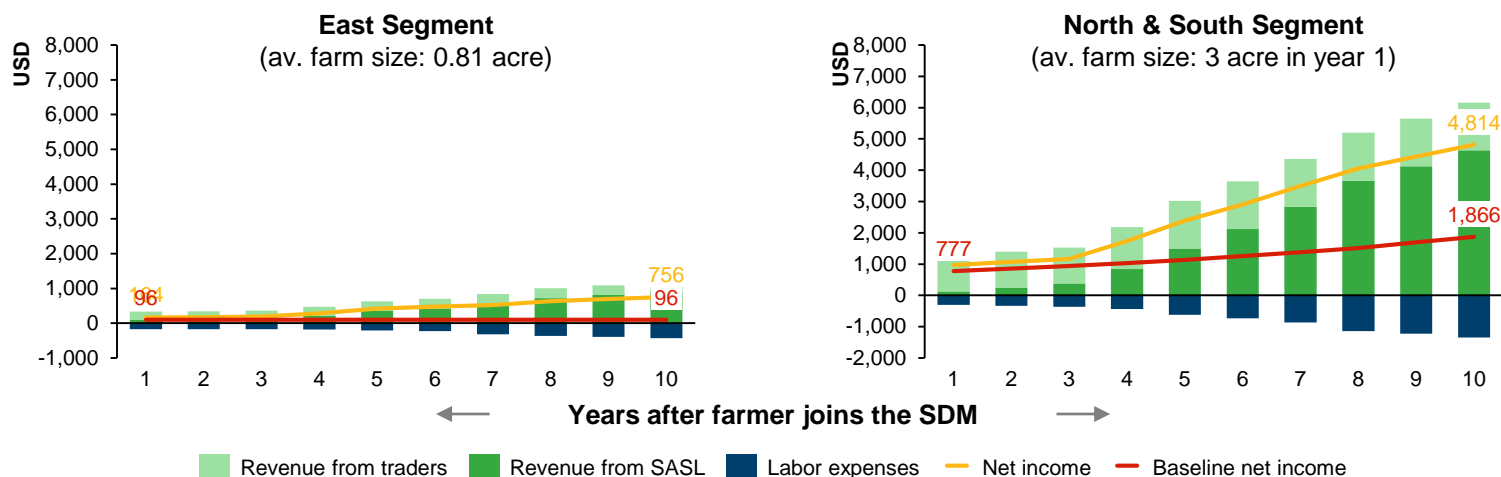
- **Demand and offtake:** Nearly 75-80% of production goes waste due to limited local fresh market demand and the absence of fruit processors other than Sierra Agra. An increase in demand and offtake of mangoes directly results in higher farm income.
- **Price competitiveness:** Weak demand for mangoes also causes a lack of competitive market pricing mechanisms.

## Main cost drivers

- **Harvesting:** Main cost. Harvesters are hired by farmers and paid a standard fee of 20,000 SLL (\$2.00) for each tree harvested and 500 SLL (\$0.05) for carrying each mango crate to the collection center.
- **Brushing:** Once a year farmers clear the vegetation along the paths accessing mango trees and under the mango tree just before harvesting.

# Overall SDM impact: Pineapple farmer P&L

Net income of farmers



## Economic sustainability at farm level

Baseline farmers in the East segment earn less from pineapple farming than those in North & South segment because: 1) the latter segment has much better market access ensuring sufficient offtake, and, 2) the East segment holds limited earning potential from pineapple due to smaller farms, less plant density and a lower market price. Pineapple farming contributes ~30% to annual farmer income in the East segment against ~100% in the case of the 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 have a higher income in comparison to their baselines because: 1) GAP training and an offtake promise from SASL are expected to drive an 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 the North & South segment due to better initial/projected conditions (agri-practices & market access) and service adoption rates.

## Main revenue drivers

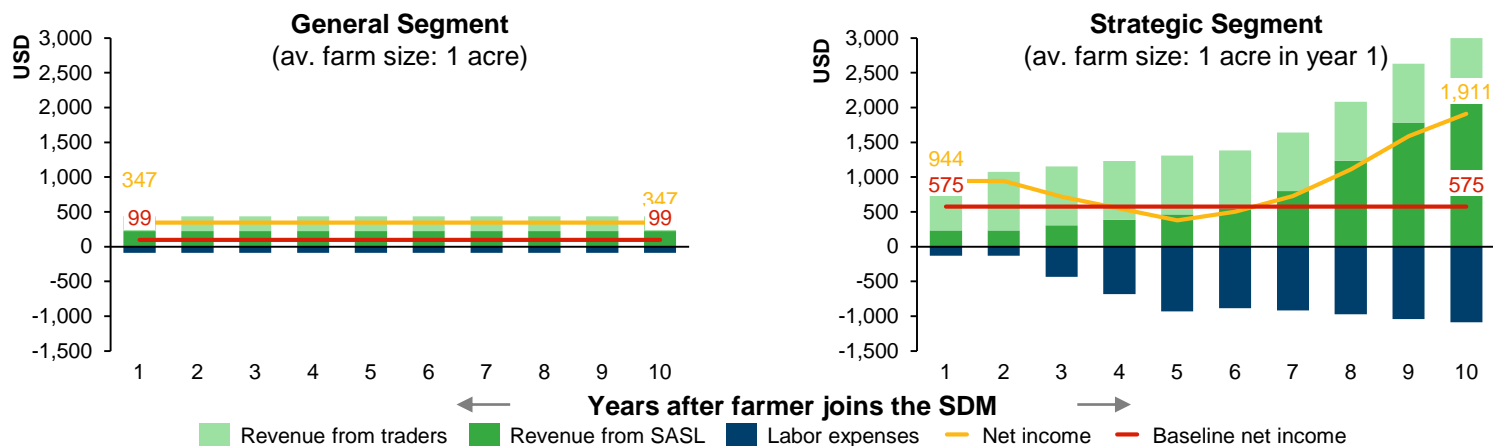
- **Production volume:** Increase in the volume is driven by: 1) Increased farm size, 2) Increased plant density, 3) bigger fruit per plant, and 4) decreased crop loss to pest.
- **Price and offtake by local traders:** Farmers with better access to market and sufficient demand are able to sell more of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

## Main cost drivers

- **Preparation and maintenance:** brushing, when done via hired labor, costs 200,000 SLL (\$20.00) per acre.
- **Harvesting:** and carrying pineapple to the collection center, when done via hired labor, cost 1,000 SLL (\$0.1) per dozen, respectively.
- **Composting:** hired labor, would cost 200,000 SLL (\$20) per pit/application-cycle. Number of pits depends upon the plant density and farm size.

# Overall SDM impact: Coconut farmer P&L

Net income of farmers



## Economic sustainability at farm level

Baseline farmers in the Strategic segment earn more from coconut farming than those in the General segment because the latter: 1) are located in challenging coastal terrains with limited access to market/demand, and, 2) have a higher production proportion of ripe fruits (which fetches a lower price than young ones). The above factors result in coconut farming contributing to ~30% of annual farmer revenue in the General segment as compared to ~60% in the case of the Strategic segment.

SDM farmers in both segments earn more than baseline farmers because of additional offtake from SASL. The Strategic segment's income from coconut is expected to increase faster than the General segment due to SASL plans to maximize sourcing from the first, while also increasing their production volumes. SASL will encourage farm expansion and the planting of shorter varieties. Due to the expected investment in increasing farm size, and general maintenance of and composting for young unproductive plants, there is expected a dip in the cashflow of Strategic SDM farmers from year 3 to 8. To avoid the cashflow dip, either SASL should ensure financing services for farmers or reduce the rate of expansion\*.

## 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 plentifully available along coastal regions. And increase in farm production would increase revenue, only if offtake is ensured.

## Main cost drivers

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

\*current calculations assume doubling of farm size in 3 years, starting from year 3



# Specific service impact: sensitivity analyses

## Pineapple expansion

The North and South pineapple farmer segment is expected to increase the average farm size from 1.2 ha to 2.9 ha and average plant density from 2,500 to 5,000 plants/ha. 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, the actual results may vary significantly. At the same time, farm size growth and plant density growth can be also seen as a high impact growth levers for farmer income. E.g. 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.

## Coconut expansion

Aggressive expansions of SASL's operation (e.g. 25% to 50% per year) 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.

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.

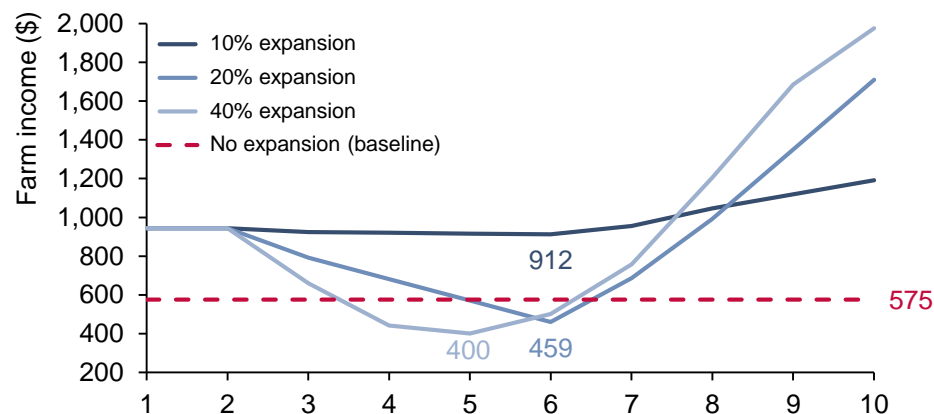
The potential returns for farmers from an investment in farm expansion are contingent on the security of future offtake. Unless SASL formally commits offtake, this investment is extremely risky from farmers' perspective because the market is already oversupplied.

**Pineapple income for North and South segment (\$/year)**

		Plant density (plants/ha)					
		2,500	3,500	4,500	5,000	5,500	6,500
Farm size (ha)	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	

--- Poverty line  
--- HH Median income

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

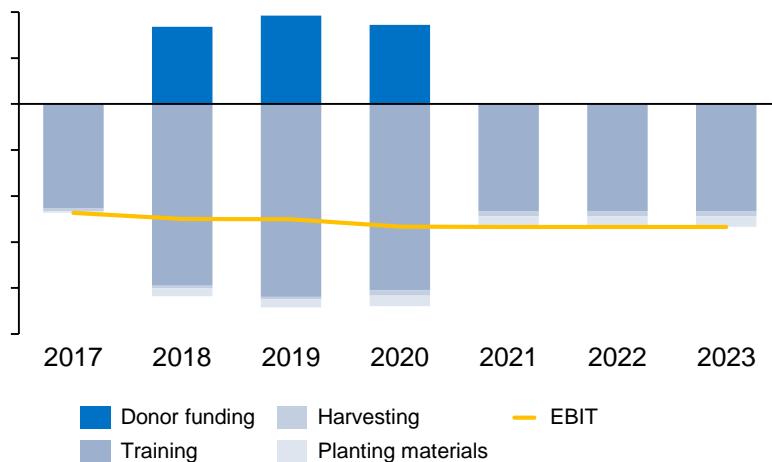


# SDM P&L, scale and sustainability

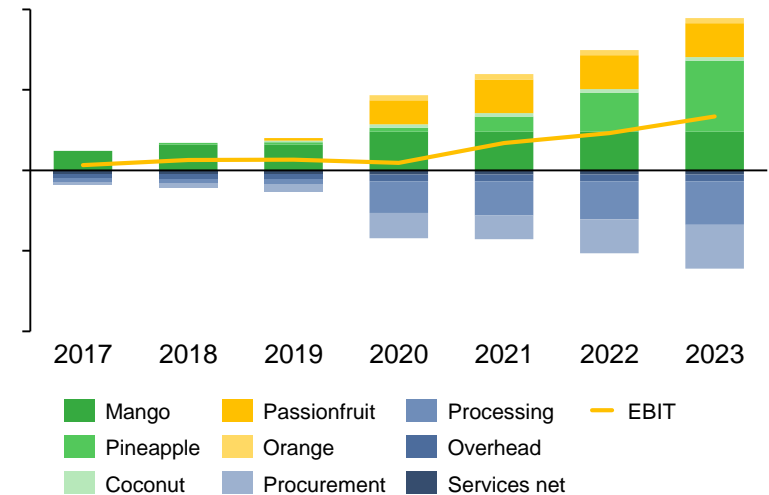
## Economic sustainability of the program

- The combined service provision activities of SASL are loss-making, peaking and staying stable from 2020 onward. SASL envisions to recoup most costs through larger sales volumes and increased margins in future.
- 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.

## Overall SDM P&L by service ('000 \$)



## Commercial operations P&L ('000 \$)

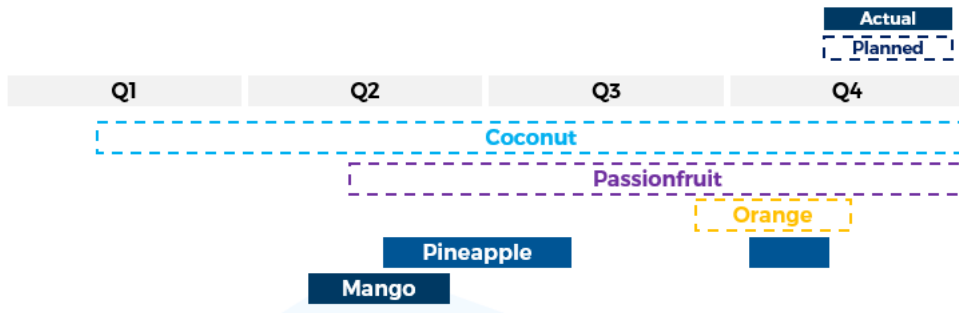


## Economic sustainability of commercial operations

- SASL is already running a profitable mango business from 2017 onwards, growing steady from 2020 onwards.
- The dip in 2020 is a result of necessary investments in processing capacity and infrastructure, while sourcing volumes of other crops are still small.

# Recognizing current processing constraints

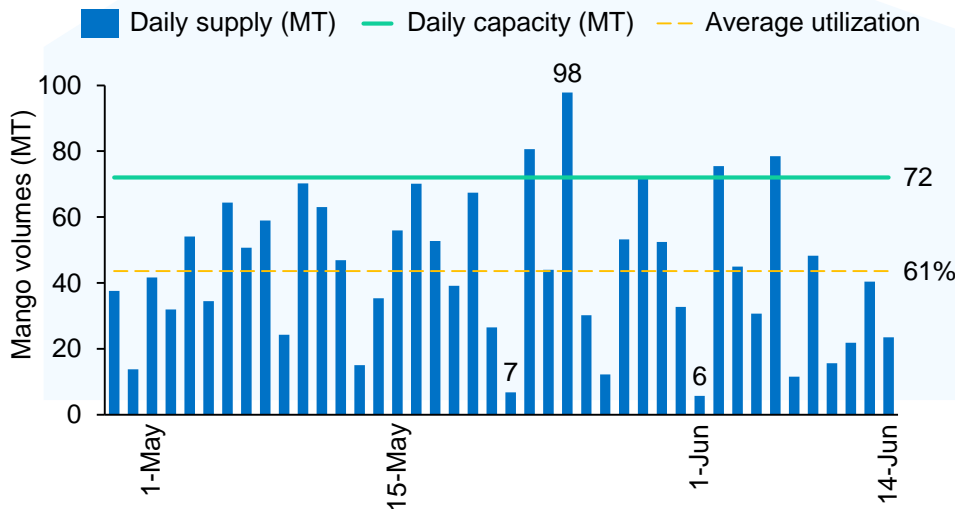
Seasons of main crops over the year



## Low utilization throughout the year

- The mango season runs from the end of April to mid-June, amounting to around 60 days. Pineapple is harvested from the end of May until the 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.

Daily mango supply and processing capacity



## 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 6<sup>th</sup> 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 21<sup>st</sup> and June 1<sup>st</sup>. On May 18<sup>th</sup> 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 result 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.

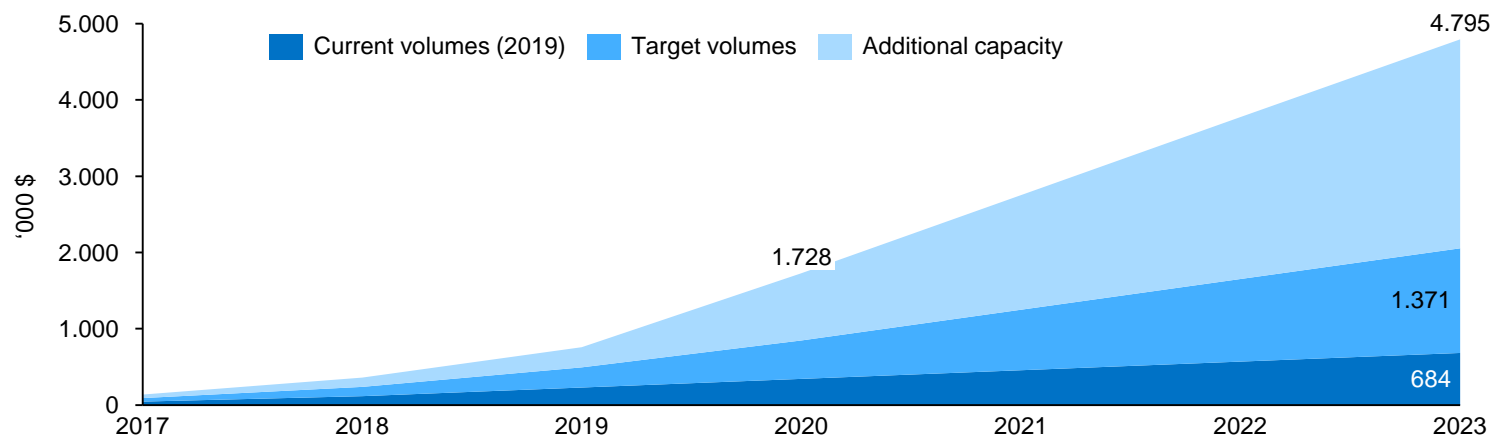
# Opportunity pathways to improve utilization

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
1. <b>Distant mango sourcing</b>	<ul style="list-style-type: none"> <li>The mangoes grown in Koinadugu district ripen later in the season and can hence be processed during otherwise idle days.</li> <li>While extending the mango season, it overlaps with pineapple being supplied and processed (seen next pathway).</li> </ul>
2. <b>Other crops (pineapple, coconut)</b>	<ul style="list-style-type: none"> <li>With only slight modifications the same processing line can be used for pineapple and coconut, and later passionfruit and orange.</li> <li>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.</li> </ul>
3. <b>Repair current processing line</b>	<ul style="list-style-type: none"> <li>Due to regular breakdown during the season, the within season utilization rate is only at 61%, while a rate of 80% should be feasible.</li> <li>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</li> </ul>
4. <b>Invest in refrigerator</b>	<ul style="list-style-type: none"> <li>Refrigeration allows storing fresh fruits to be processed later (after peak days; on client demand).</li> </ul>
5. <b>Invest in IQF (Individual quick Freezing)</b>	<ul style="list-style-type: none"> <li>Cold storage allows freezing fruits to be sold as frozen fruit chunks.</li> <li>For mango this would be an immediate opportunity as there is still a large untapped supply base.</li> </ul>
6. <b>Invest in dehydration</b>	<ul style="list-style-type: none"> <li>Dehydration allows drying fruits (at a decentralized location) to be sold as dried fruit chunks.</li> </ul>
7. <b>Install new production line</b>	<ul style="list-style-type: none"> <li>Installing a new line will further expand processing capacity and allows processing to different fruits in parallel.</li> <li>Only necessary as volumes are expected to greatly exceed currently installed processing capacity.</li> </ul>
8. <b>Invest in ripening chamber</b>	<ul style="list-style-type: none"> <li>A ripening chamber allows quick ripening of early harvested mangoes, allowing processing even before the current start of the season.</li> </ul>

# Total value generated at farm level

**Total farm value generated** ('000 \$ per year, all farmers)



## 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.

# SDM outcomes and main learning questions

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

SDM objectives*	Projected outcomes
<p><b>1</b> Run a sustainable mixed fruit juices company in Sierra Leone</p>	<ul style="list-style-type: none"> <li>• By 2023, the projected annual EBIT is \$3.4 million, and a total value generated at farm-level of \$1.4 million. It is key to this, to have a capable management team; right investors and strategic partners; abundant supply and limited competition.</li> <li>• The main risk is the limited clarity about processing expansion capacity and costs necessary to process the growing volumes efficiently.</li> </ul>
<p><b>2</b> Secure and grow supply of sustainable fruits, especially mango, pineapple and coconut</p>	<ul style="list-style-type: none"> <li>• Sourcing volumes are expected to grow 68% y-o-y in the period 2017-2023.</li> <li>• Supply is secured by being the sole off-taker buying in bulk (mango, coconut), building relationships with communities via SASL field staff and free services (mango, pineapple, coconut), and managing own plantations (pineapple, passion fruit)</li> </ul>
<p><b>3</b> Improve incomes and livelihoods of smallholder farmers and their families</p>	<ul style="list-style-type: none"> <li>• 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 segments). North &amp; South pineapple farmers already earn well above the poverty line.</li> <li>• 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.</li> </ul>

Learning question	SDM insights
<p><b>What is the most financially viable option to increase the processing capacity?</b></p>	<p>To assess this, 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 need 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.</p>
<p><b>What is the optimal combination of services that can be delivered to farmers?</b></p>	<p>Access to export markets is the main value add for especially mango and coconut farmers. Beyond the off-taking relationships, farmers need to be and are served by a combination of training, planting materials and harvesting support, with a slightly different focus given the type of fruit they grow.</p>

\*A fourth objective is Support the local ecosystem (health service and logistical support for NGOs). However, 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 insights



## Key opportunities

- The **global demand** for mixed juices (fruit and fruit-vegetables) is growing.
- **Growing domestic demand** for juices is not satisfied yet locally.
- **Raw materials** are abundant, allowing relatively easy scale-up of mango volumes and expansion into other fruits and vegetables.
- **Limited competition**, 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.
- Relatively untapped supply of organic fruits and vegetables available in abundance **may attract competitors to market.**
- **Changing weather patterns** affected fruit harvests this year as rains came in later than expected.
- **Pests and diseases** are a consistent risk of crop yields and quality.
- To guarantee fruits are grown and sourced organically will be more difficult with a **growing chemical industry** to combat pests and diseases in Sierra Leone.



## 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.
- The SASL **team has strong ties** with both the international (buyers) and the local community (government).
- SASL has a **capable implementation team** in place necessary to manage, scale-up and improve the current operations in factories and fields.



## Improvement areas

- **SASL can become more efficient** by improving the utilization of the processing line.
- SASL could improve **alignment between strategy and implementation.**
- There is **limited capacity on key business positions**, which places additional pressure on the implementation team.
- There are **infrastructural constraints.** The SASL processing line is not connected to the grid, relying heavily on fuel-based generators.



**David Black**  
*Program Officer, Fresh & Ingredients*



**Wouter van Monsjou**  
*SDM Manager*



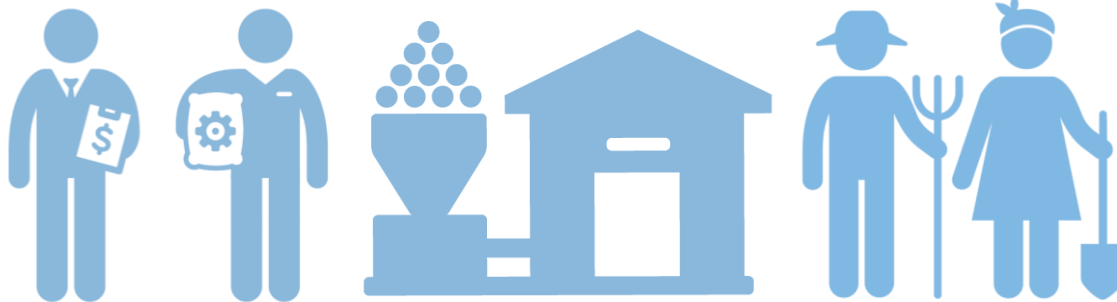
**Vishnu Reddy**  
*SDM Manager*



**Silvana Paniagua Tufinio**  
*Senior Consultant*



**Apoorve Khandelwal**  
*Consultant*



For more information and insights on SDM's, see the [IDH Smallholder Engagement Report](#)