



## Business Case: Mango Orchard Maintenance Service Provider





## Description of Business Model

The entrepreneur equips and trains a team of labourers to provide a range of orchard maintenance services through the year to neighbouring small-scale mango farmers who do not have the scale, labour or capital to do this maintenance themselves.

Yields improve from the current average of 5 tons per ha, 50% export grade, to 10 tons per ha with 60% export grade, radically improving the farmers profit per ha.

The maintenance service provider (SP) works with a mango exporter or trader to prefinance the services. The exporter/trader deducts the cost of the services from the price paid to the farmer after the harvest.

In addition, the SP offers planting and orchard rehabilitation services to farmers who require them.



## Typical Entrepreneur

### *Entrepreneur*

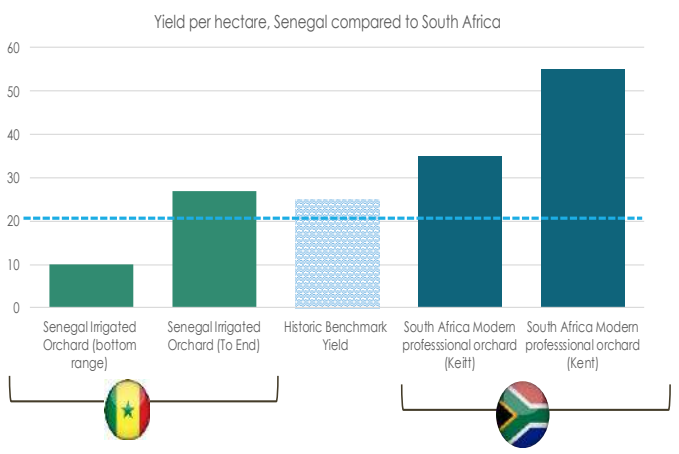
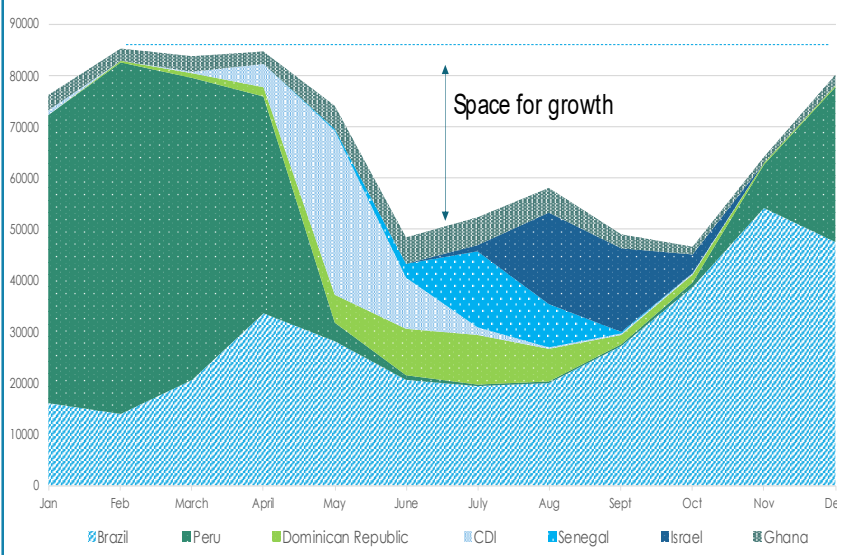
- **An emerging mango farmer** who sees the value of good orchard maintenance who invests in equipment and sells services to neighbouring farmers.
- **A mango exporter** who wants to increase the volumes of export grade fruit from his farmer supplier base.
- **A mango trader** who needs to secure more fruit to resell. *1<sup>st</sup> Grade is sold to exporters. 2<sup>nd</sup> Grade is sold to market women who resell on the local fresh market.*

### Market

Senegal has a unique export window for mangoes from May to July. During this period, the leading suppliers of mango in South America are not producing. As a result, there's great potential to expand mango production from small-scalers in Senegal because there is no other Kent or Keitt mango on the EU market. Between €15 000- € 30 000 per month of fruit can be accommodated on the market from Mid May to October (see figure below), which represents a doubling of the current capacity. The price paid by EU importers per 4 kg box of Kent and Keitt mango peaks at between € 5 and € 6 due to the scarcity of mango during Senegal's unique window.

The farm gate price of second grade mango on the local fresh market is also very high at FCFA 150 (€0,225) with market women competing for this lucrative trade during the mango season. Market women resell the fruit for FCFA 300 per kg.

European Imports by Lead Origins  
2019, Euros



### Rationale for investment

**Senegal's unique EU market window:**

- Good orchard maintenance has been shown to have a radical impact on yields and percentage of export grade fruit, if done at the right time and in the right way.
- Small-scale farmers in Senegal currently lack the knowledge, labour and capital to invest in their orchards and as a result achieve yields of up to 5 tons per ha, a third of that achieved by commercial farmers.
- Some farmers do prune, apply fertilisers and may use fruit-fly traps if subsidized. However, these activities are often done in the wrong way.
- Exporters, traders and farmers all have a major incentive to invest in orchard maintenance practices that improve yields and fruit quality.

### Service

SERVICE	Price per Ha	Price in Euro
Maintenance pruning	80 000	122,00
Rehabilitation Pruning	150 000	228,65
Spraying for Fruitfly	25 000	38,00
Foliar spray at fruit set	18 000	27,43
Foliar fertiliser and fungicide spray	31 000	47,25
Brushcutting (weed control)	12 000	18,29
Insecticide spraying	22 000	33,53
Harvest	142 000	216,46
Planting grafted clones (400/ ha)	320 000	487,80
Package deal (excl. planting & rehabilitation pruning)	330 000	503



### Key Assumptions

#### Staff

- The team includes 6 trained and equipped service providers.
- In year 1, only one team is employed. However, in subsequent years additional teams can be added to reduce the fixed costs of operation.
- A mechanic is employed throughout the season.

#### Services

- Each 6 man team can service 100ha over the course of the year. This includes a variety of services from pruning to spraying & even harvesting.
- Pruning services include mulching or chipping of pruned wood which is returned to the orchard floor, improving soil fertility.
- Services are delivered inclusive of fuel, transport and inputs.

#### Equipment

- Equipment includes vehicles such as 2 , a motorbike and a truck for harvesting.
- The model allows for various cutting equipment- chainsaw and parts, 2 machetes, a chipper, a pole pruner, a planting auger, picking crates and a mist-blower.

#### Safety

- Protective clothing and training are fixed costs which are repeated every year.

#### Financing

- The model assumes that 50% of the investment costs are self financed.

#### Cost of Services

- Cost of services are calculated on time taken per tree or per ha with 100 trees per ha. This is based on orchard maintenance trials conducted in Ghana and adapted for Senegal.

#### Maintenance

- Maintenance on equipment is assumed to be 20% of the purchase price.
- This is in keeping with the heavy wear and tear on cutting equipment such as chainsaws, pruning poles etc.



### Production Costs & Gross Margins

Name of the product/service	Revenues per product	Variable costs per product	Gross margin per product	Gross margin per unit of sales	Gross margin per unit of sales (in %)
Maintenance Pruning	12 195,12	8 319,21	3 875,91	38,76	32%
Rehabilitation of large trees	2 286,59	1 510,88	775,71	77,57	34%
Planting	12 195,12	8 190,93	4 004,19	160,17	33%
Spraying for fruit fly	3 810,98	2 544,21	1 266,77	12,67	33%
Foliar fertiliser Spraying at fruit set	2 743,90	1 788,11	955,79	9,56	35%
Brush cutting	1 829,27	1 198,17	631,10	6,31	35%
Insecticide spray	3 353,66	2 265,24	1 088,41	10,88	32%
Combined foliar and fungicide spraying	14 176,83	9 471,04	4 705,79	15,69	33%
Harvesting	21 646,34	14 405,49	7 240,85	72,41	33%
<b>Total</b>	<b>74 237,80</b>	<b>49 693,27</b>	<b>24 544,53</b>		<b>33%</b>

### Profit and Loss year 1

Year	2021
<b>Revenues</b>	
Maintenance Pruning	8 000 000
Rehabilitation of large trees	1 500 000
Planting	8 000 000
Spraying for fruit fly	2 500 000
Foliar fertiliser Spraying at fruit set	1 800 000
Brush cutting	1 200 000
Insecticide spray	2 200 000
Combined foliar and fungicide spraying	9 300 000
Harvesting	14 200 000
<b>Total revenues</b>	<b>48 700 000</b>
<b>Variable costs</b>	
Maintenance Pruning	5 457 400
Rehabilitation of large trees	991 136
Planting	5 373 250
Spraying for fruit fly	1 669 000
Foliar fertiliser Spraying at fruit set	1 173 000
Brush cutting	786 000
Insecticide spray	1 486 000
Combined foliar and fungicide spraying	6 213 000
Harvesting	9 450 000
<b>Total variable costs</b>	<b>32 598 786</b>
<b>Gross margin</b>	<b>16 101 214</b>
<b>Fixed costs</b>	
Maintenance and insurance	5 022 890
Fixed staff	1 200 000
Other fixed costs	720 800
Depreciation	4 712 431
Long term loan interest expenses	-
Seasonal loan interest expenses	-
<b>Total fixed costs</b>	<b>11 656 121</b>
<b>Profit before tax</b>	<b>4 445 093</b>
Applicable tax	-
<b>Net income</b>	<b>4 445 093</b>
<b>Cumulative net income</b>	<b>4 445 093</b>

### Investments Required

Investments	Cost FCFA
Equipment	20 209 201
Vehicles	6 018 000
Office and workshop	2 116 600
<b>Total</b>	<b>28 343 801</b>
<b>EURO</b>	<b>43 207</b>

### Working Capital requirement

Fixed costs per month are FCFA 720 800.  
The business should have 2 to 3 months of working capital.

Services are paid cash on delivery

### Return on Investment

ROI  
• 6 Years





### Cost Benefit for farmers and off-takers

Existing situation			
Small-scale mango farmer with low input and yields			
			FCFA
Yield	Kg/ha	Price FCFA	5 000,00
Export Grade	50%	300,00	2 500,00
Local Grade	50%	150,00	2 500,00
<b>Revenue</b>			<b>1 125 000,00</b>
<b>Variable costs</b>		Cost FCFA	
Pruning	30 days	2 500,00	75 000,00
Fertiliser	3 bags+Labour	9 000,00	27 000,00
Manual Weed control	6 mandays	3 000,00	9 000,00
Harvest	10 mandays	3 000,00	30 000,00
<b>Total Variable cost</b>			<b>141 000,00</b>
<b>Gross Profit</b>		87%	<b>984 000,00</b>

Improved situation			
Small-scale mango farmer with mechanised service			
			FCFA
Yield	Kg/ha	Price FCFA	10 000,00
Export Grade	60%	300,00	6 000,00
Local Grade	40%	150,00	4 000,00
<b>Revenue</b>			<b>2 400 000,00</b>
<b>Variable costs</b>		Cost FCFA	
Mechanised service package	1	330 000,00	330 000,00
Fertiliser	3 bags+Labour	9 000,00	27 000,00
Manual Weed control			
Harvest			
<b>Total Variable cost</b>			<b>357 000,00</b>
<b>Gross Profit</b>		85%	<b>2 043 000,00</b>

#### Farmers

- Yields are expected to double if the full suit of maintenance services are applied.
- This increases farmers revenue per ha from FCFA 984 000,00 to FCFA 2 043 000 at a cost of only FCFA 330 000.
- In the event these yields are not achieved, farmers would need at least a 1 ton/ha improvement in yield and no increase in export grade fruit to break even.

#### Off-takers

- Off-takers will benefit from increased volume of fruit.
- Increase in exportable grades.

Breakeven yield improvement			
Small-scale mango farmer with mechanised service			
			FCFA
Yield	Kg/ha	Price FCFA	6 000,00
Export Grade	50%	300,00	3 000,00
Local Grade	50%	150,00	3 000,00
<b>Revenue</b>			<b>1 350 000,00</b>
<b>Variable costs</b>		Cost FCFA	
Mechanised service package	1	330 000,00	330 000,00
Fertiliser	3 bags+Labour	9 000,00	27 000,00
Manual Weed control			
Harvest			
<b>Total Variable cost</b>			<b>357 000,00</b>
<b>Gross Profit</b>		74%	<b>993 000,00</b>



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### Capability and Skills

#### Entrepreneur

- Experience and training in horticulture specifically mango farming in Senegal is needed.
- Good mathematical literacy and admin skills are required.
- Business and negotiating skills should be solid.

#### Machine operators & mechanic

- Annual training in health and safety, equipment maintenance and agrochemical use.

#### Team members

- Annual training in health and safety.
- On the job training in orchard maintenance and harvesting.



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### Pre-finance agreement with off-taker

- Due to the significant cost of services, small-scale farmers will require pre-finance for the first year of services.
- The off-taker recovers the cost of the services from the price paid for fruit.
- The services should be provided to farmers with a previous supply relationship with the offtaker.



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### Proximity of large number of mango orchards

- Each team of 6 can service 100 ha of orchards, performing different services throughout the year, according to the agricultural calendar.
- The model is highly scalable. Investment in equipment and vehicles per team of 6 is approximately FCFA 26 million (€ 39,634). Inclusion of additional teams reduces the fixed cost of operating.



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### Services must improve yield and fruit quality

- Maintenance pruning improves yields and fruit quality by letting light into the canopy, resulting in more flowers and reddening up of Kent and Keitt mango, which is a requirement for export fruit.
- Pesticide spraying, especially for fruit-fly is essential in the production of EU export quality fruit and reduces the risk of containers being rejected in the port of destination.
- Foliar fertilisers and fungicides improve the internal quality and external quality of fruit.
- Foliar sprays at fruit set increase yields and cause fruit to ripen more or less at the same time.
- Planting with grafted clones give higher yields and bear sooner than seedlings.
- Services should only be offered on farms with exportable varieties.



### Risk Analysis

#### **Shortage of farmers willing to invest in services during year 1**

- Farmers and off-takers will need to see the benefits with their own eyes.
- In year 1 the service provider may not be able to find enough work to cover fixed costs and investments.

#### **Phytosanitary Issues:**

- There is some risk that unsterilized equipment can transmit diseases such as fusarium from one orchard to the next.

#### **Unwillingness of farmers to invest**

- Small-scale farmers are accustomed to a low input, low yield model with high margins due to the low cost-base. They will need to see the financial benefits for themselves before being willing to invest their own money in orchard maintenance.

#### **Side-selling and default on pre-finance**

- Farmers who receive prefinance from the off-taker may sell some or all of their fruit to other off-takers, to avoid reimbursement of the prefinance.

#### **Lack of irrigation**

- To get the yields of 15 tons a hectare achieved by commercial farmers, irrigation is essential, and not available to small-scale farmers.
- Without irrigation, doubling of yields and revenue may not be possible. The breakeven yield improvement required to cover in the investment would be 1,5 tons/ha or 29%.

#### **Non-payment by farmers or off-takers**

- The Senegalese have an expression "To buy does not mean to pay!"

#### **Injuries and exposure to pesticides**

- There is significant risk associated with the use of chainsaws and many agro-chemicals.



### Risk Mitigation

#### **Shortage of farmers willing to invest in services during year 1**

- If the service provider is a farmer, he should master the techniques on his own farm and use this as a demonstration farm to show the results.
- If the service provider is an off-taker, they should have a network of farmers with whom they have worked. This will provide a strong client base for the service provider business. Offering prefinance for the first year of services on 1 ha per farmer should convince farmers as to the value of the services.
- The business should start with just 1 team in the 1<sup>st</sup> year and teams should be paid per ha, per service and not employed as fixed staff, this will also motivate team leaders to find work and to perform services efficiently.

#### **Phytosanitary issues**

- Thorough cleaning of equipment and protective clothing with a fungicide (chlorine bleach) can mitigate risk of transfer of diseases by the service teams.

#### **Unwillingness of farmers to invest**

- Prefinancing of the first year's services on 1 ha.
- Guaranteed results should be possible. No improvement = no payment.

#### **Side-selling and default on pre-finance**

- Any prefinaanced services should include a mandatory harvesting service, guaranteeing the off-taker receives the fruit.
- If the service provider works with the farmer throughout the year, they will be known when the orchard is ready to pick and reduce the risk of someone else getting there first.

#### **Lack of irrigation**

- The benefits of orchard maintenance on mango have been tried and tested in Senegal and around the world. The 30% improvement of yields required to cover the full-service package is easily achievable, if not certain.

#### **Non-payment by farmers or off-takers**

- Harvest by the service provider is the best guarantee that services are paid for.

#### **Injuries and exposure to pesticides**

- Health and safety training is repeated annually. Only trained people should operate machinery or mix chemicals.





### Economic & Social Impact

- Job creation
- Income improvement for farmers, off-takers and exporters through better yield and higher % exportable fruit
- Training and skills transfer
- Generation of income for market women through increased quantity and quality of local grade fruit
- Economic sustainability of the mango sector in Senegal
- Reduction of Senegal's trade deficit
- Reduction of economic impact of fruit-fly and other insect pests and diseases



### Environment Sustainability

- Mulching and brushcutting increase organic content of soils
- Establishment of orchards reduces soil erosion
- Control of plant pests, especially fruit-fly



### Women & Youth

- Service provider jobs and skill development for young men
- Seasonal jobs for women especially picking and sorting of fruit
- Increase in revenue for market women who sell fresh mango on the local market
- Reduction of youth migration to cities through local job creation



### Knowledge Transfers

While the Netherlands is a leading importer of fruit, mango production is not a key competence.



### Commercial Trade

There would be an increase in availability of high quality Kent and Keitt mango for Dutch importers during the May to September window when prices are highest.



### Technology

There may be opportunities for Dutch companies to sell agro-chemicals such as paclobutsol, bion and bee friendly insecticides.



### State Institutions, Universities

**ISRA:**  
ISRA is responsible for agricultural research in Senegal. They would be an important stakeholder in research and training of staff.

**Extension Services**  
ANCAR is responsible for coordinating extension services. They work through agencies that focus on specific tasks in the various regions.

Mango development has not been tackled by ANCAR to a great extent. Nevertheless they could be useful allies in setting up the system and integrating knowledge into existing programs.



### Private Sector

**Large exporters who source from small scale producers**  
These producers are often also growers and would benefit from being able to source quality fruit from small scalars in their system. They could be a key resource in identifying small scale producers suitable to receive orchard maintenance services. As a potential off taker they could play an important role in securing finance required from MFI's or banks.

**MFI's**  
The funding required by small-scale farmers and mechanised service providers is better suited to MFI's. As a result, developing interest and understanding from MFI's could be a useful support to mechanised service providers as they establish their businesses.



### Professional Associations

**AUMN**  
This is the leading market gardener association in Les Niayes. They would be a helpful resource in identifying potential locations for service providers, identifying investors who could be individual, aggregators or mango exporters.





This business case was developed by Sense  
[www.timeforsense.com](http://www.timeforsense.com)

