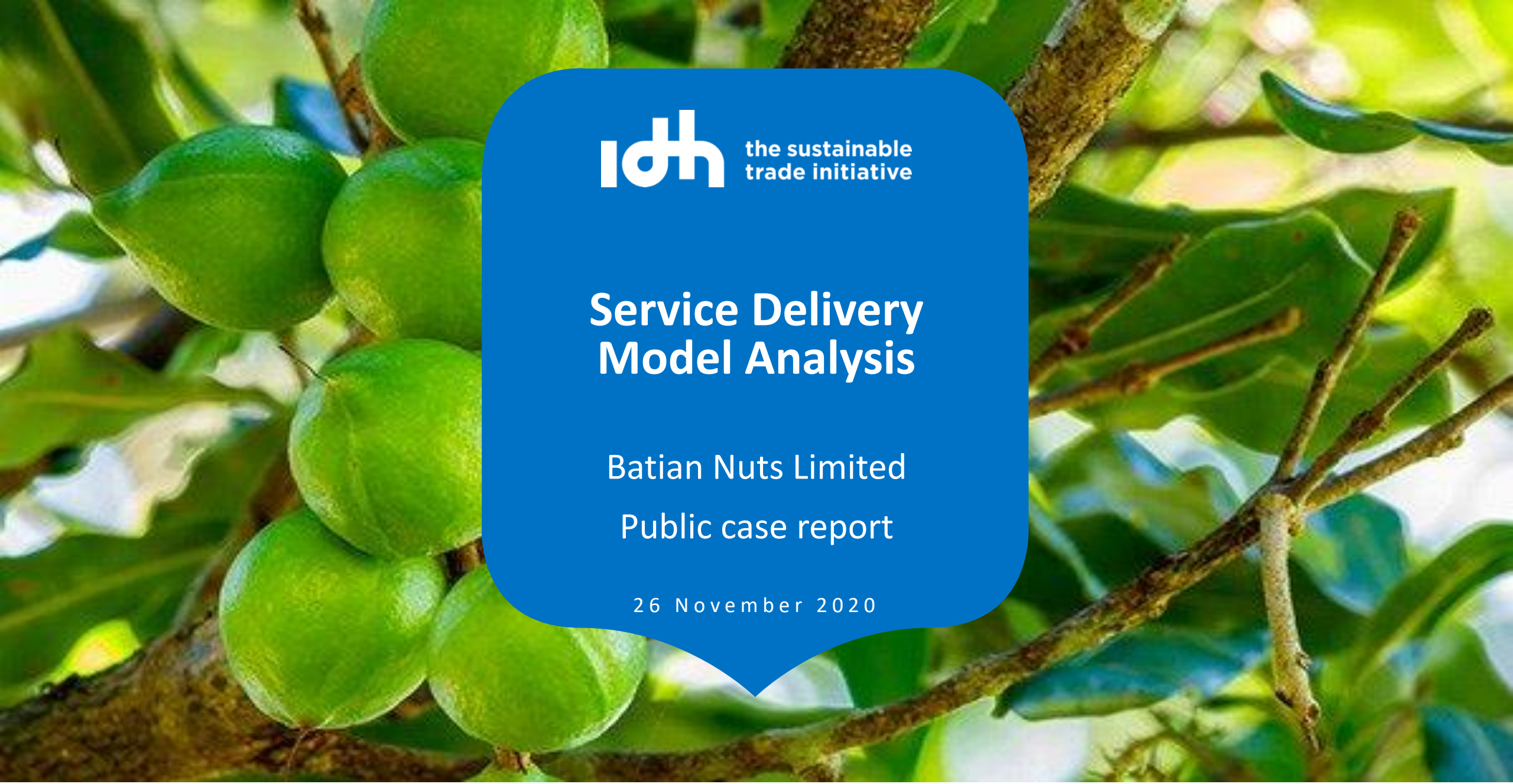


Service Delivery Model Analysis

Batian Nuts Limited

Public case report

26 November 2020

Contents

Introduction

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

Batian Nuts Ltd introduction

Batian Nuts Ltd is an edible nuts processor in Kenya, with a focus on exporting macadamia nuts and ambitions to diversify its nut processing portfolio

Company overview

Batian Nuts Ltd (BNL or Batian Nuts) is an agro-processing company incorporated in 2017 as a private limited liability company and principally processes and exports macadamia nuts. Batian Nuts' factory and principal offices are in Nyagene village, Meru County, Kenya. The founders of Batian Nuts form a team of skilled and experienced businesspeople and professionals. This team has diverse and deep experience in Agribusiness and especially in the Kenyan edible nuts industry. The Batian Nuts Factory currently has an installed processing capacity for processing raw macadamia Nut In Shell (NIS). The Business is now in its third year of full operations.

Mission and Vision

Mission: To inspire prosperous communities, team members, and shareholders through value addition in the edible nuts value chains.

Vision: To be a world class processor and marketer of the best food products while improving the livelihoods of our stakeholders and conserving the environment along the value chains in which we operate.

Outgrower operations

- Batian Nuts was started so that it could capture and fill in a gap in the off taking of macadamia nuts, peanuts and cashew nuts produced by smallholder farmers in the larger Meru region, comprising of Tharaka Nithi and Meru Counties
- These crops are grown by small-scale growers and the produce is processed and the products are largely exported to the United States of America, Europe and Asia
- Batian Nuts has a fully-fledged macadamia processing factory, and it maintains a fleet of vehicles for transporting produce from the farmers and produce aggregators and also for farmer advisory services

Source: Batian Nuts Ltd – Company Profile

Executive summary

Executive Summary

- Batian Nuts Ltd is a young agro-processing company (est. 2017) that principally processes and exports high quality macadamia nuts, for which the market is highly volatile. The company is looking to diversify its product portfolio by venturing into processing other edible nuts including peanuts, for which the market is local and less volatile, and further in the future, cashew nuts.
- The market dynamics for macadamia nuts are likely to change in the coming years due to growing supply and changing consumer behaviour, and this brings uncertainty for Batian Nuts on how to best position itself in the market. On the peanut-side of the business, the production of aflatoxin-free peanuts is notoriously difficult yet critical to achieve for Batian Nuts in order to enter the market. Also raising affordable finances for expansion of capacity is considered a challenge. This challenge is exacerbated due to a COVID-19 triggered slump in macadamia sales, leading to Batian Nuts experiencing cash flow challenges.
- This study sets out the most important recommendations for Batian Nuts to sustainably scale up its business in line with its growth ambitions. These recommendations are structured along three main topics: (1) securing consistent demand; (2) expanding processing capacity; and (3) securing consistent supply:

    1. Batian Nuts will secure consistent demand by positioning itself strategically in the macadamia and peanut markets. We explore the differences between the macadamia and peanuts markets, leading to different approaches respectively:
        - A change in macadamia market dynamics may lead to a change in clients and their priorities, creating opportunities for Batian Nuts
        - By selecting the most promising channels for its macadamia nuts, Batian Nuts positions itself to secure multi-year contracts
        - Batian Nuts will differentiate itself from competitors by guaranteeing locally grown volumes of aflatoxin-free peanuts at a competitive price, but it needs to find a way to process peanuts at a profit
    2. Batian Nuts will be able to expand its processing capacity by securing affordable financing:
        - Batian Nuts's plan to expand processing capacity leads to a projected spend of USD [redacted] (peak) working capital and of USD [redacted] (total) of CAPEX
        - Batian Nuts's financing requirements can likely be secured through a mix of traditional financing sources
        - Batian Nuts' projected impact at farm-level can be leveraged to finance business growth with more affordable impact finance
    3. Batian Nuts will secure consistent quality and quantity of macadamia and peanuts by strategically addressing farmer needs:
        - Batian Nuts will differentiate itself from other nuts buyers by continuing to (i) pay a higher price than local aggregators, (ii) pay upon acceptance of produce and (iii) train farmers
        - Batian Nuts will reach consistent quality and quantity of supply by ensuring that it invests in the most effective services for both farmers and Batian Nuts
        - If necessary, Batian Nuts will further increase farmer loyalty by creating incentives for farmer groups to consistently meet agreed volumes and quality
        - Batian Nuts will increase farmer retention by investing in services aimed at increasing farmer resilience
- The results of this study show that Batian Nuts is expected to be in a position to sustainably scale up its business in line with its growth ambitions. However, macadamia processing will remain the biggest portion of the portfolio (in revenues) for the coming years, leaving the company highly exposed to the volatility of the macadamia market. This exposure is further exacerbated by the fact that the profit Batian Nuts makes on the macadamia portfolio subsidizes the peanut portfolio so long as it is not profitable.

Summary of financial projections

Revenue (USD)	2021	2022	2023	2024	2025
Gross margin (%)	36%	31%	28%	26%	27%
Operating margin (%)	21%	17%	16%	15%	16%
Scenario analysis*	Scenario 1 / Scenario 2	Scenario 1 / Scenario 2	Scenario 1 / Scenario 2	Scenario 1 / Scenario 2	Scenario 1 / Scenario 2
Debt to equity	3.44 / 2.39	3.81 / 2.04	2.76 / 1.47	2.19 / 1.18	1.72 / 1.06
Return on equity (%)	29% / 24%	28% / 24%	28% / 21%	22% / 16%	28% / 21%
Debt to asset ratio (%)	75% / 68%	76% / 64%	70% / 57%	65% / 52%	60% / 49%
Interest coverage ratio	1.84 / 2.00	1.76 / 2.19	2.07 / 2.53	2.09 / 2.49	2.79 / 3.24

*Scenario analysis captures different financing options for the CAPEX and working capital spend. Refer to section 2B of the Recommendations for further details on this.

Recommendations

Securing demand

1. Batian Nuts will secure consistent demand by positioning itself strategically in the macadamia and peanut markets

Macadamia: Anticipate change in macadamia market dynamics

1.A A change in macadamia market dynamics may lead to a change in clients and their priorities, creating opportunities for Batian Nuts

Consumption has grown in line with supply, indicating further growth in demand

Even though the macadamia market is expected to stay small compared to other edible nuts markets, there is reason to expect demand to continue growing as supply volumes and security increase.

Three growth dimensions are clearly emerging [1]

(1) Global consumers are looking for **more nutritious diets**
(2) European consumers are looking for **organic products**
(3) Food & beverage and cosmetics & personal care industries are looking for more processed macadamia as **ingredients**

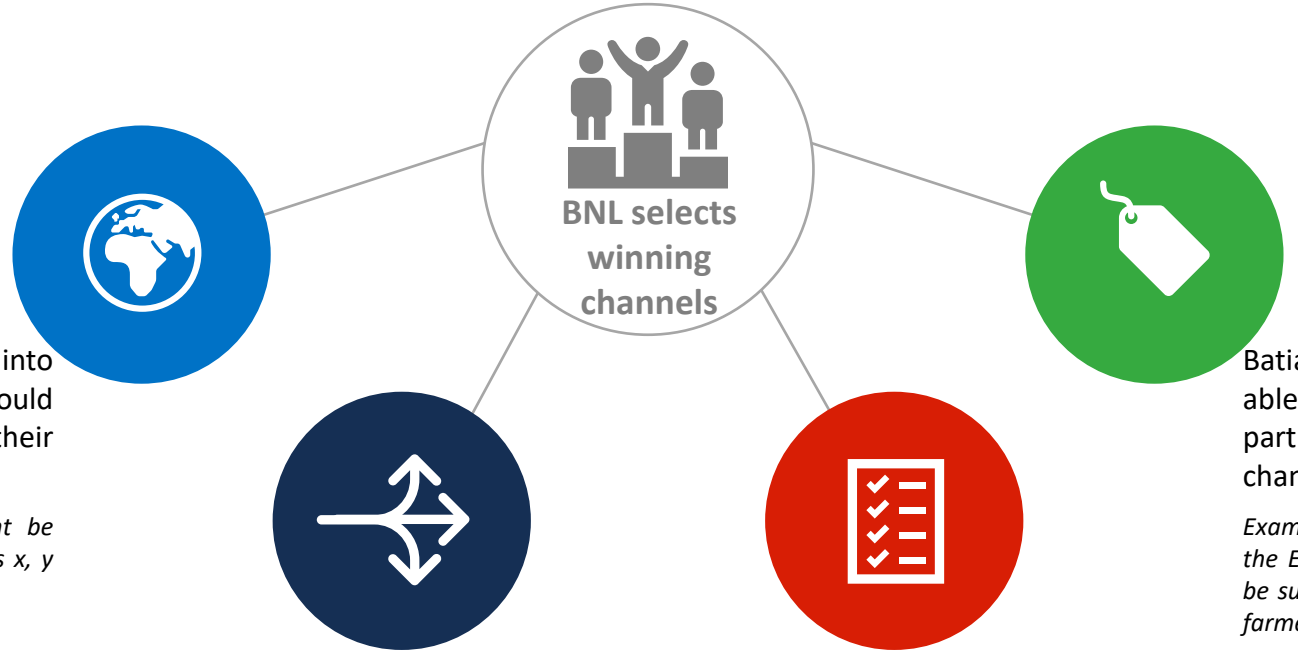
Batian Nuts needs to strategically position itself to select the most promising channels

To understand the market dynamics that will be the consequence of the growth in global supply versus these three dimensions of growth and which opportunities they create for Batian Nuts versus current channels, they should invest in strategic market research with a reputable agency

Sources: [1] Macadamia Market - Growth, Trends and Forecasts (2020 - 2025)

Macadamia: Position to secure multi-year contracts

1.B By selecting the most promising channels for its products, Batian Nuts positions itself to secure multi-year contracts



Geographical trends

Market research will give insights into which geographies Batian Nuts should target versus avoid based on their respective demand trends.

Example: demand for macadamia nuts might be expected to grow fastest in European countries x, y and z

Price points

Batian Nuts can determine whether it is able to maintain a viable margin for a particular channel, by comparing the channel price points to costs.

Example: the margins for macadamia exported to the European consumer market might or might not be sufficient to absorb the cost of full traceability to farmers

Segments trends

The most promising dimensions of growth will inform which channels and products (segments) to focus on.

Example: consumer demand for roasted and salted macadamia might be where the biggest growth is expected

Client requirements

Clients per segment and geography will have typical product requirements, which Batian Nuts can strategically meet.

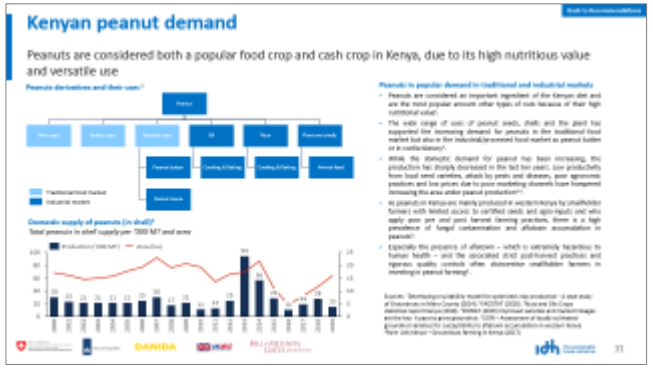
Example: perhaps European consumer demand can only be met with full traceability to farmers

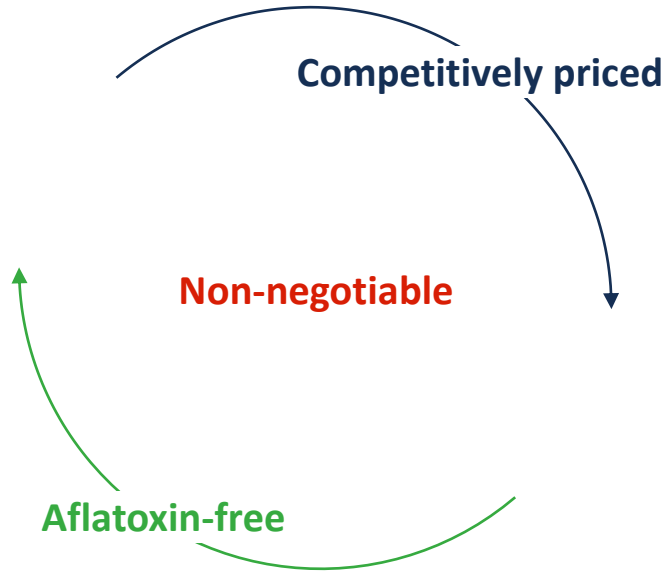
Peanuts: Guarantee aflatoxin-free peanuts at a competitive price

1.C Batian Nuts will differentiate itself from competitors by guaranteeing locally grown volumes of aflatoxin-free peanuts at a competitive price, but it needs to find a way to process peanuts at a profit

Aflatoxin-free

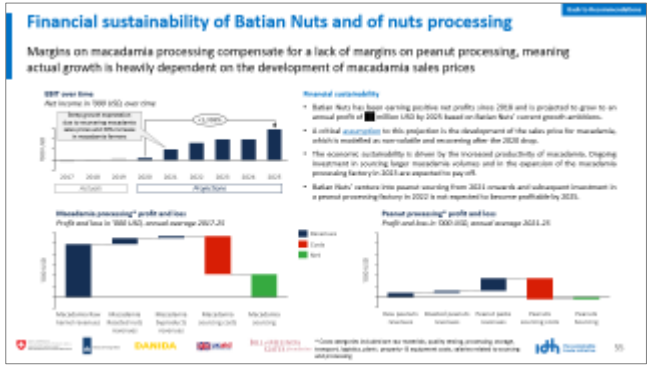
Kenyan demand for peanuts and peanut-based products is expected to remain strong[1]. Due to a lack of local supply, most of peanuts processed and consumed in Kenya are imported.





Competitively priced

Batian Nuts will need to compete on sales price with importers of aflatoxin-free nuts. In order to do so operations must be highly cost-efficient. Under current assumptions, peanut processing is not expected to become profitable by 2025.

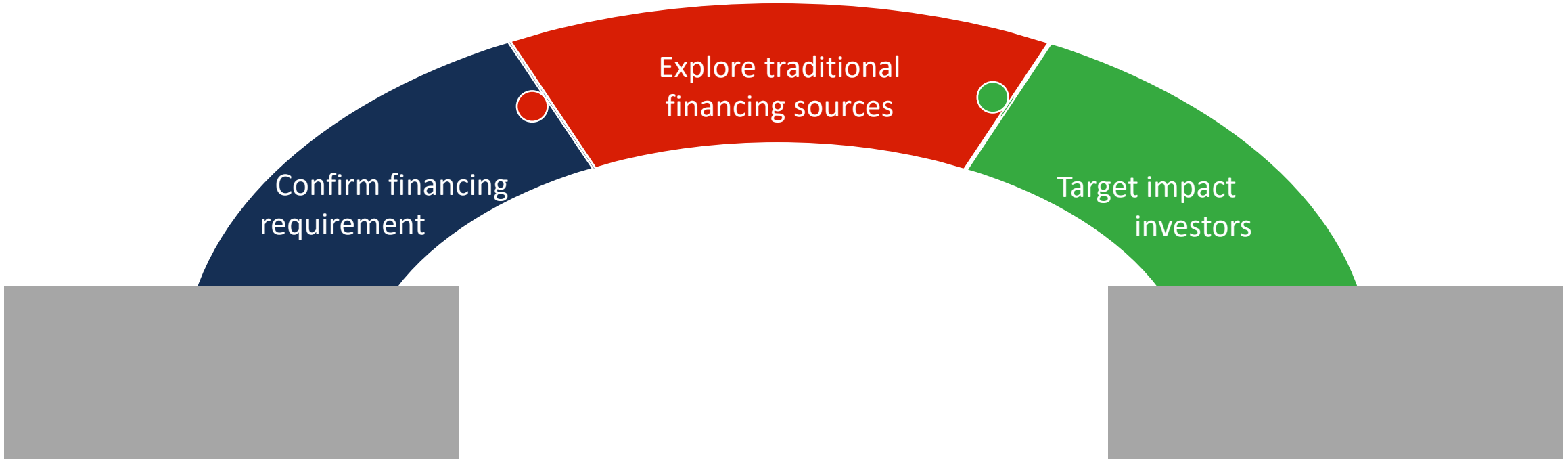


The two non-negotiables for entering the Kenyan peanut market are **aflatoxin-free** and **competitively priced** products. Batian Nuts is expected to be successful in securing demand in the Kenyan peanut market if it can deliver on these non-negotiables, while positioning itself as a reliable supplier of **locally produced** peanuts and is able to commit to delivering **large volumes year-on-year** to a select number of large local off-takers[1].

Sources: [1] Interview with established player in Kenyan edible nuts industry. These expectations should be stress-tested with other market experts.

Expanding processing capacity

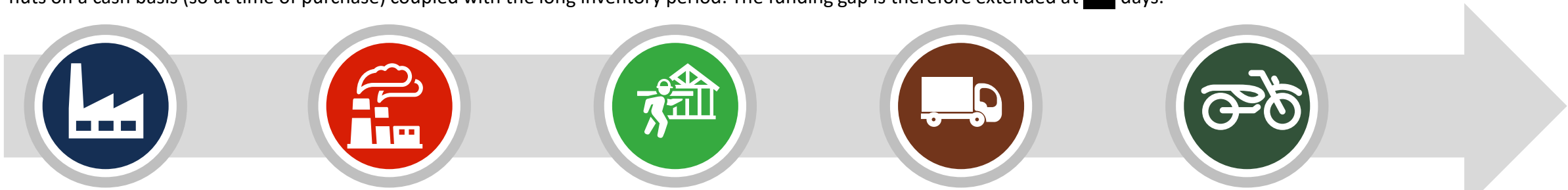
2. Batian Nuts will be able to expand its processing capacity by securing affordable financing



Confirm financing requirement

2.A Batian Nuts' need for external financing is primarily driven by working capital projections. From 2023 onwards CAPEX can be internally financed from cashflow

Batian Nuts' annual net working capital requirement is projected to average [redacted] of their total annual sales. The heavy working capital requirement is a result of paying for raw nuts on a cash basis (so at time of purchase) coupled with the long inventory period. The funding gap is therefore extended at [redacted] days.

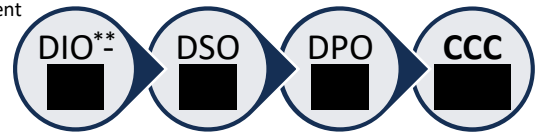


2021	2022	2023	2024	2025
Expansion of macadamia capacity	Building of peanut processing plant	Building of a central seed store and purchase of additional equipment	Purchase of additional equipment	Purchase of additional equipment

	2021	2022	2023	2024	2025	
CAPEX spend projections:	USD [redacted]	USD [redacted]	USD [redacted]	USD [redacted]	USD [redacted]	**Total: USD [redacted]**
Net working capital spend projections:	USD [redacted]	USD [redacted]	USD [redacted]	USD [redacted]	USD [redacted]	**Peak: USD [redacted]**
Total annual CAPEX & WC spend:	USD [redacted]	USD [redacted]	USD [redacted]	USD [redacted]	USD [redacted]	
Annual external financing requirement*:	**USD [redacted]**	**USD [redacted]**	**USD [redacted]**	**USD [redacted]**	**USD [redacted]**	

* In 2021 and 2022 Batian Nuts is in an overdraft position of USD [redacted] and [redacted] respectively, these amounts have been included in the external financing requirement

** DIO – Days Inventory Outstanding, DSO – Days sales outstanding, DPO – Days Payables Outstanding, CCC – Cash Conversion Cycle



Explore traditional financing sources

2.B Batian Nuts' financing needs can likely be secured through a mix of traditional financing sources

Based on Batian Nuts' relatively low financial leverage (current debt to equity ratio of 1.85 in 2020 which declines to below 1 in 2021 onwards if no financing is sought to grow the business), seeking external debt to finance the expansion might be a reasonable option for the business to explore. However, financing the business expansion plans purely through external debt increases Batian Nuts' balance sheet risk and therefore it would be important to ensure that borrowings remain at an acceptable level for the business.

Historically, Batian Nuts has maintained the debt to equity ratio at below 2. To reduce the financial risk associated with being highly leveraged, Batian Nuts could consider injecting additional equity from the existing shareholders (to avoid share dilution) or externally. This option improves their debt ratios and the interest coverage as indicated below thus reducing the solvency risk. However, feasibility of this option is dependent on if and how soon Batian Nuts can raise the additional equity.

Assumptions:

- [redacted]
- [redacted]
- [redacted]

SCENARIO 1: 100% DEBT FOR CAPEX

Scenario 1 CAPEX assumption:

- 100% of the CAPEX requirement is financed through long-term debt (drawn-down in 2021, 2022 and 2023 as needed).

Ratios:

- **Debt to equity:** 2021: 3.44, 2025: 1.72
- **Debt to assets:** 2021: 75%, 2025: 60%
- **ICR:** 2021: 1.84, 2025: 2.79
- **ROE:** 2021: 29% , 2025: 28%
- **Interest paid:** 2021 – 2025: USD [redacted]
- **Pre-tax profit:** 2021: USD [redacted], 2025: USD [redacted]

SCENARIO 2: 50% DEBT + 50% EQUITY FOR CAPEX

Scenario 2 CAPEX assumption:

- 50% of the requirement CAPEX requirement is financed through additional equity from shareholders (USD [redacted] invested annually between 2021 and 2024) and the balance from long-term debt (drawn-down in 2021, 2022 and 2023).

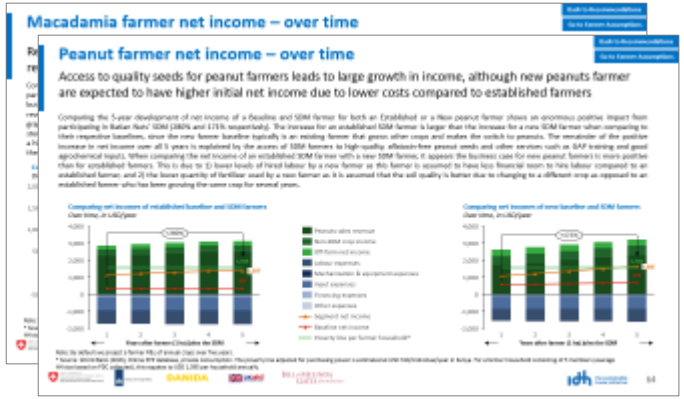
Ratios:

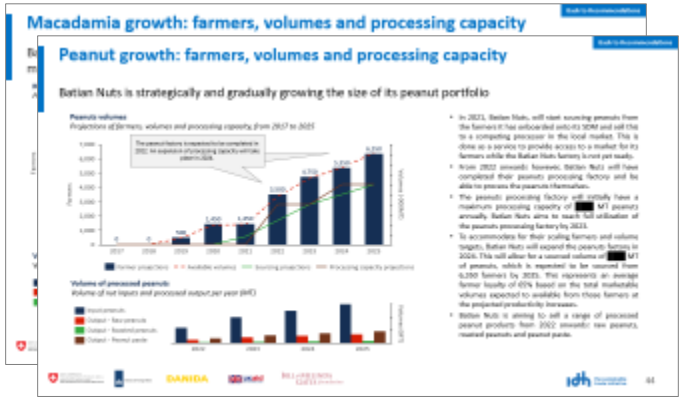
- **Debt to equity:** 2021: 2.39, 2025: 1.06
- **Debt to assets:** 2021: 68%, 2025: 49%
- **ICR:** 2021: 2.00, 2025: 3.24
- **ROE:** 2021: 24%, 2025: 21%
- **Interest paid:** 2021 – 2025: USD [redacted]
- **Pre-tax profit:** 2021: USD [redacted], 2025: USD [redacted]

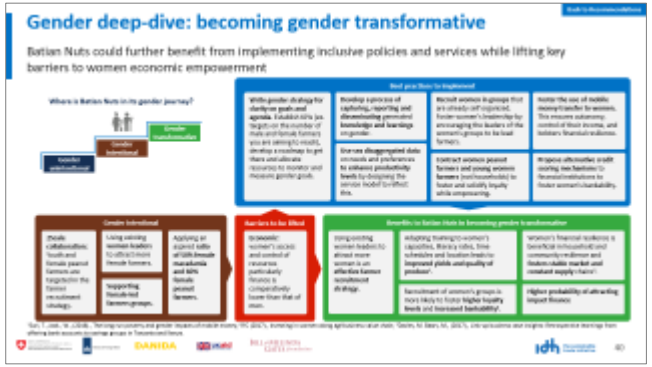
Target impact investors

2.C Batian Nuts' projected impact at farm-level can be leveraged to finance business growth with more affordable impact finance

Currently Batian Nuts works annually to secure working capital loans from Root Capital. Batian Nuts can potentially unlock additional and typically more affordable impact investments based on their projected impact on the livelihoods of farmers. This option allows Batian Nuts to access cheaper capital, not only to run their business but also to pursue their expansion plans whilst achieving the required return, social as well as financial, for the impact investor.







Farmer livelihoods

Farmers currently generate incomes that are significantly below the poverty line. Absolute net incomes of macadamia farmers as well as peanut farmers increase significantly through participation in the SDM (by 144% and 280% respectively for established farmers), bridging part of the gap to the poverty line.

Farmer scale

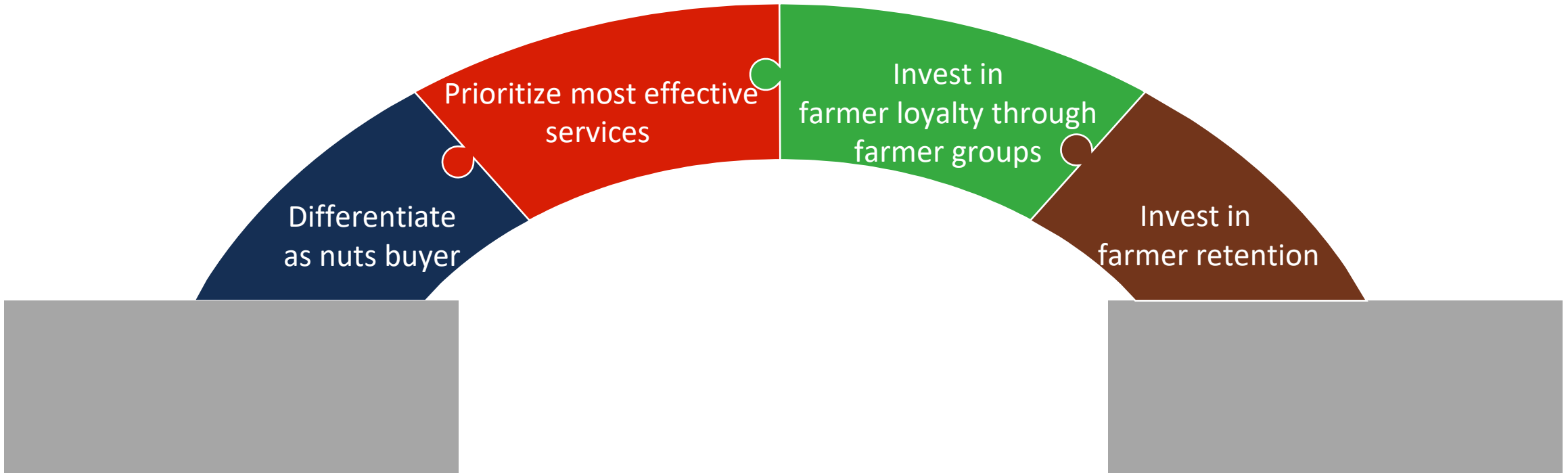
Batian Nuts expansion plans would mean reaching increasing numbers of farmers and their households: from 5.7k macadamia farmer households in 2020 to 9.6k in 2025, and from the current 1.5k peanut farmer households today to 6.4k in 2025.

Gender equality

Further strengthening its commitment to the effective inclusion of female farmers is expected to bring multiple benefits to Batian Nuts: more effective farmer recruitment, improved yields and quality of produce, higher loyalty levels, increased bankability as well as a higher probability of attracting impact finance.

Securing supply

3. Batian Nuts will secure consistent quality and quantity of macadamia and peanuts by strategically addressing farmer needs



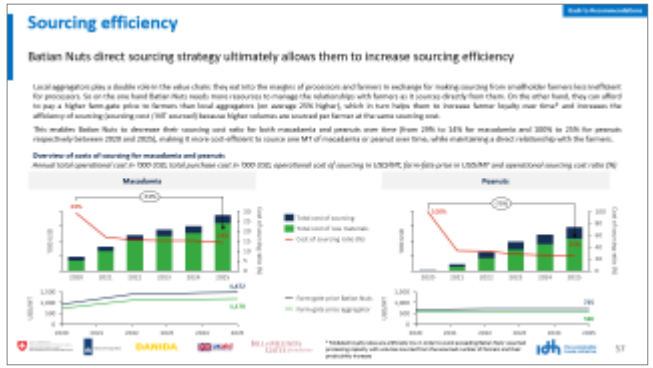
Differentiate as nuts buyer

3.A Batian Nuts will differentiate itself from other nuts buyers by continuing to (i) pay a higher price than local aggregators, (ii) pay upon acceptance of produce, and (iii) facilitate best practices

There are many factors influencing a farmer's choice in who to sell their produce to, but timing of payment and price are generally seen as decisive factors. Our projections for the financial sustainability of Batian Nuts' SDM assume that the share of a farmer's marketable surplus sold to Batian Nuts ("farmer loyalty") will increase over time because Batian Nuts continues to pay pretty much immediately and to offer better prices than other nuts buyers. Maintaining those key success factors over time is considered of paramount importance to the success of the SDM but comes at a cost. The graphs below demonstrate what that cost consists of:

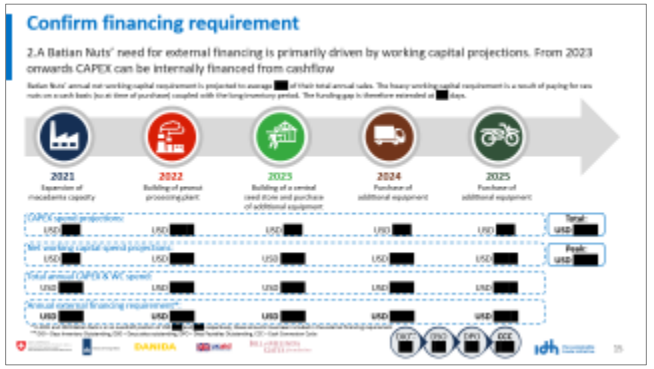
(i) Pay a higher price than local aggregators

Direct sourcing allows Batian Nuts to consistently pay a higher farm-gate price per MT than local aggregators, ensuring that the volume sourced per farmer goes up over time. This in turn brings down the cost of sourcing per MT and allows Batian Nuts to leverage scale and continue to pay a higher price to farmers than aggregators.



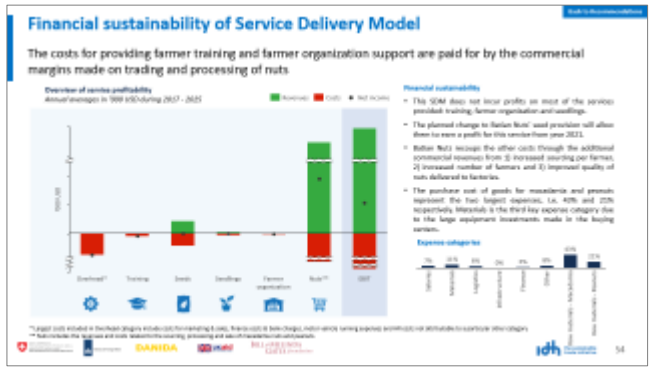
(ii) Pay upon acceptance of produce

As local aggregators and other buyers pay farmers immediately, Batian Nuts will have to ensure that it is in a position to do the same. This requires increasing trade capital as sourced volumes grow over time, which is reflected in the growing need for working capital set out in the previous section.



(iii) Facilitate best practices

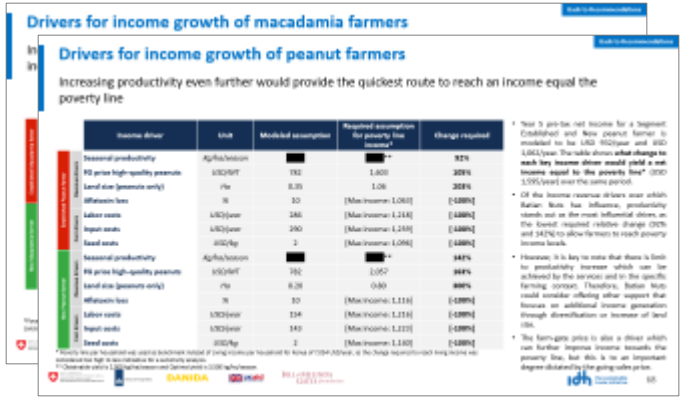
Farmers have confirmed their appreciation of the training on good agricultural practices provided to them by Batian Nuts. While the investment in providing training does not provide a direct return to Batian Nuts, without it the impact of providing high-quality seedlings and seeds is undercut.



Prioritize most effective services

3.B Batian Nuts will reach consistent quality and quantity of supply by ensuring that it invests in the most effective services for both farmers and Batian Nuts

Not all services offered to farmers by Batian Nuts will have an equal impact on farmer income, nor will they all contribute equally to the security of supply that Batian Nuts seeks to achieve. In order to determine which services are most critical to the success of the Service Delivery Model, we look at the efficiency and impact of services from the farmer as well as the SDM Operator perspective. Services that can realistically and efficiently generate impact at both farm and SDM Operator level, will be the most effective and thus critical to implement successfully.

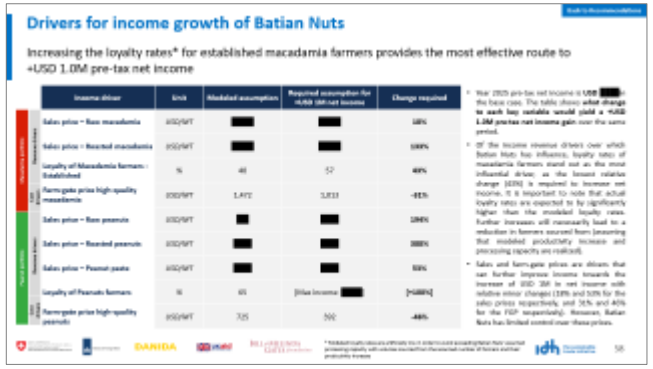


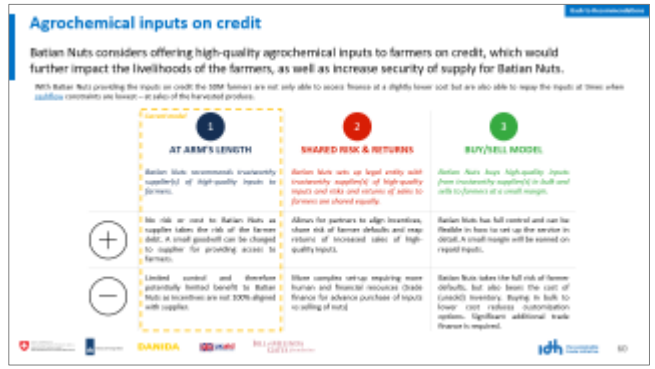
Drivers of farmer income

Of the services which Batian Nuts currently offers the provision of high-quality macadamia seedlings is the most impactful in increasing macadamia farmer income, just as the provision of quality seeds is most impactful in increasing peanut farmer income, as these are the services currently offered that contribute to the most effective driver for higher farmer incomes: productivity.

Drivers of Batian Nuts' income

Batian Nuts invests in its farmers by offering several services to increase yields and as we've seen thereby contributes indirectly to higher farmer incomes. Increasing loyalty of macadamia farmers is a realistic* and (other than higher sales prices) the most effective way for Batian Nuts to capture the added value of these investments and reach a higher net income.





Inputs on credit

A promising future service currently considered by Batian Nuts is providing farmers with inputs on credit. We have outlined three different models for setting up such a service and recommend to explore the "Shared risks and returns" in more detail and to understand the cost of the additional working as well as human capital that will be required to offer this service to farmers.

* Modeled loyalty rates are artificially low in order to avoid exceeding Batian Nuts' assumed processing capacity with volumes sourced from the assumed number of farmers and their productivity increase

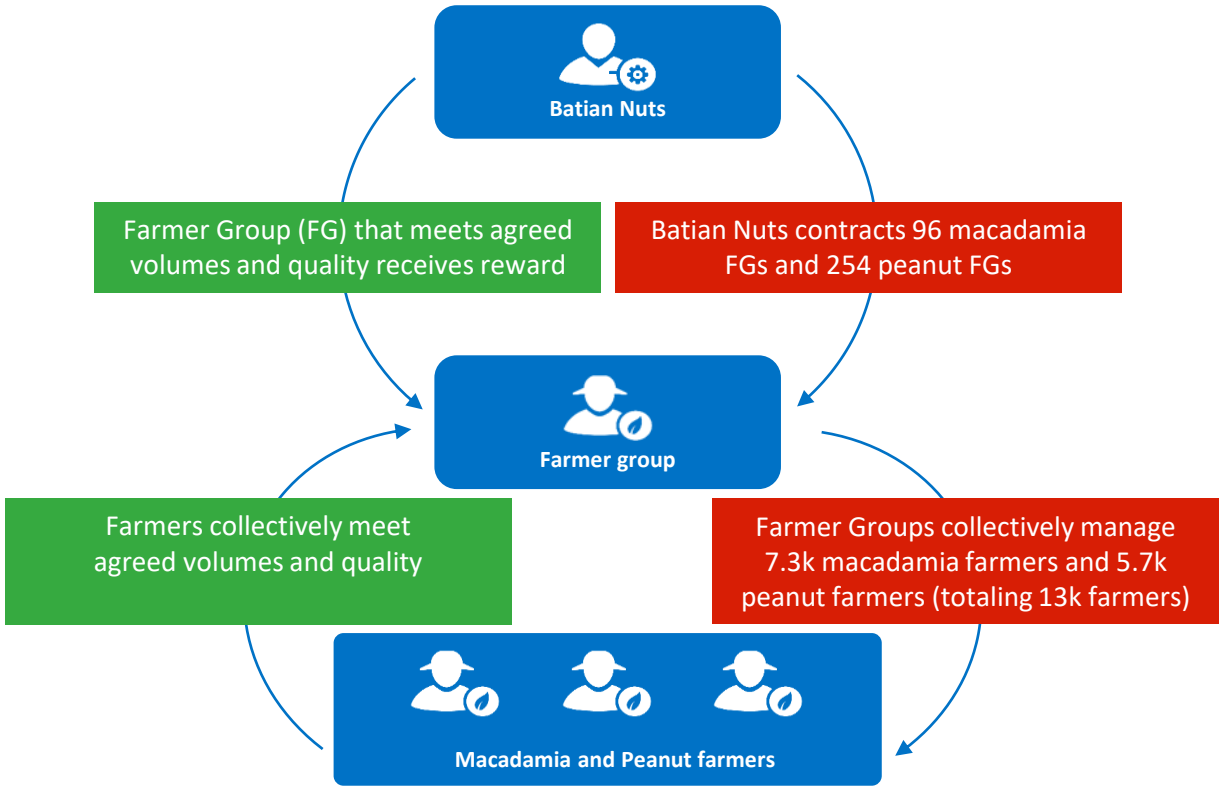
Invest in farmer loyalty through farmer groups

3.C If necessary, Batian Nuts will further increase farmer loyalty by creating incentives for farmer groups to consistently meet agreed volumes and quality

In reality macadamia farmers sell a higher portion of their produce to Batian Nuts than we've assumed in our modelling*, so increasing farmer loyalty is not seen as an urgent challenge for Batian Nuts. However, if Batian Nuts decides to reduce the number of farmers it works with, an investment in farmer loyalty may be needed. In such a scenario, we recommend Batian Nuts to test the effectiveness of contracting specific volumes, quality and prices and to reward contract compliance. We expect that this will incentivise farmers to not just sell higher portions of their produce to Batian Nuts but also to consistently meet the volume and quality that Batian Nuts seeks, thereby increasing security of supply.

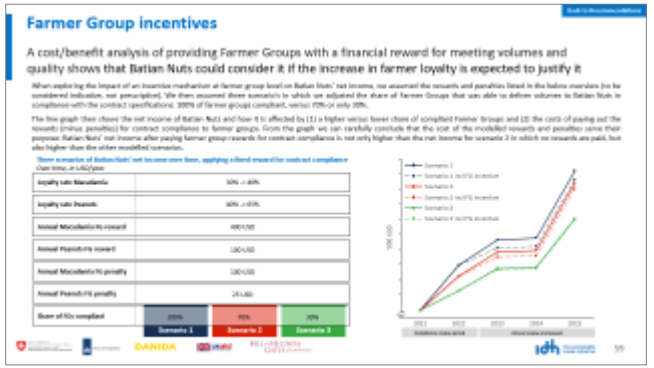
Contracting Farmer Groups

We advise contracting at farmer group level (rather than per farmer) as it has two advantages: (1) it is less likely to overburden Batian Nuts resources with contracting and compliance monitoring per farmer (**350** farmer groups versus **13k** farmers), and (2) it leaves flexibility in terms of which farmers together contribute to contract compliance, so long as the farmer group as a whole meets the contract specifications.



Farmer Group incentives

We analyzed three different scenarios to demonstrate the potential costs and revenues associated to the farmer group incentive set-up and recommend to explore in more detail if Batian Nuts believes the additional farmer loyalty outweighs the costs.



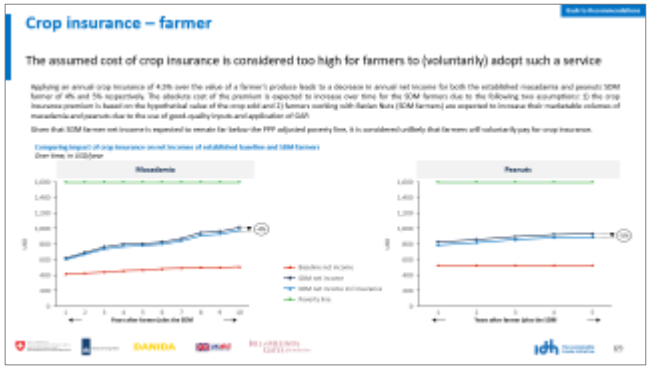
* Modeled loyalty rates are artificially low in order to avoid exceeding Batian Nuts' assumed processing capacity with volumes sourced from the assumed number of farmers and their productivity increase

Invest in farmer retention

3.D Batian Nuts will increase farmer retention by investing in services aimed at increasing farmer resilience, like crop insurance

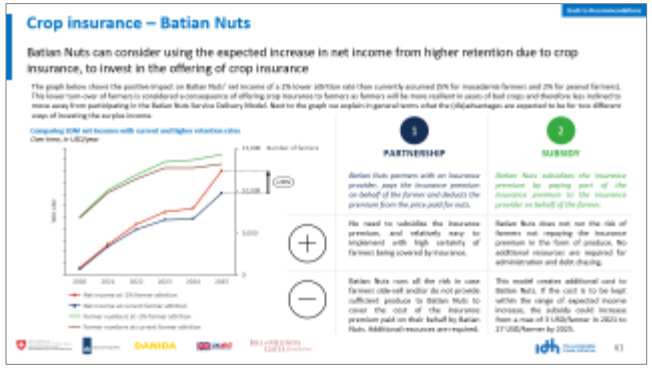
Crop insurance is considered an effective way to increase farmer resilience, as it prevents farmers from having to sell assets and puts them in a position to invest in the next season's crop in case of a bad crop year. This resilience of farmers is important to Batian Nuts, as it is expected to have a positive impact on the farmer retention rate (the portion of farmers that continues to sell to Batian Nuts year on year after being onboarded into the Service Delivery Model). As such, even if they have to resort to sourcing from farmers outside their Service Delivery Model during a bad crop year, Batian Nuts can return to sourcing from historically onboarded farmers rather than having to invest in the training of new farmers.

For crop insurance to work in practice, the cost needs to be affordable for farmers. Using an assumption of the cost of insurance for Kenyan smallholder farmers and offsetting that against modelled farmer net income, any cost of crop insurance is expected to be prohibitive in practice. However, the expected benefits for Batian Nuts on farmer retention may justify an investment in making insurance mandatory as part of a bundled service package to farmers or subsidizing the cost of the insurance premium.



Impact on farmer net income

Based on current assumptions, the net income of farmers would be negatively impacted by the cost of insurance by 4-5%. Even though this is a low cost, it is still considered very unlikely that farmers will voluntarily pay for crop insurance.



Impact on Batian Nuts net income & delivery

A higher retention rate than currently modeled based on the impact of insurance, would increase the net income for Batian Nuts by 18-28%, which could be considered as the 'room to play' for investing in the offering of such a service and making it affordable to farmers.

Annex

1. CONTEXT

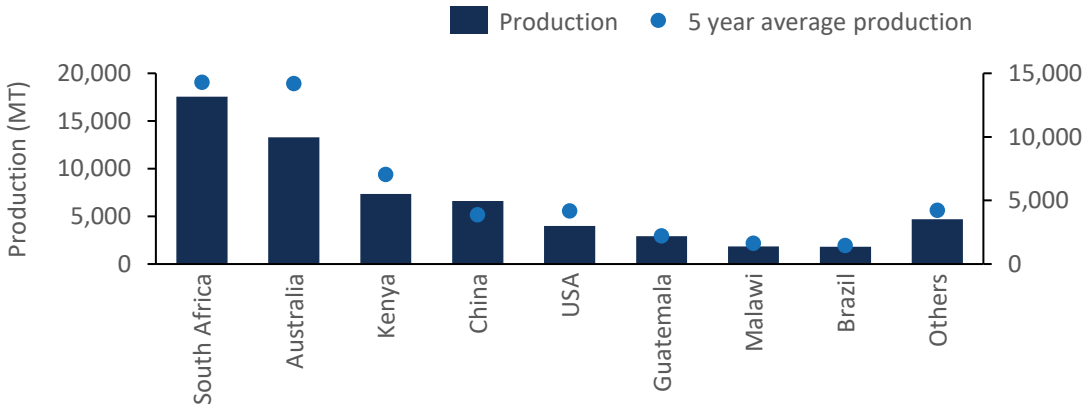
Introducing the macadamia and peanuts sectors in Kenya, its challenges and priorities

Global macadamia supply

Global macadamia production has been on an upward trend. Kenya is the third largest macadamia nuts producer after South Africa and Australia worldwide

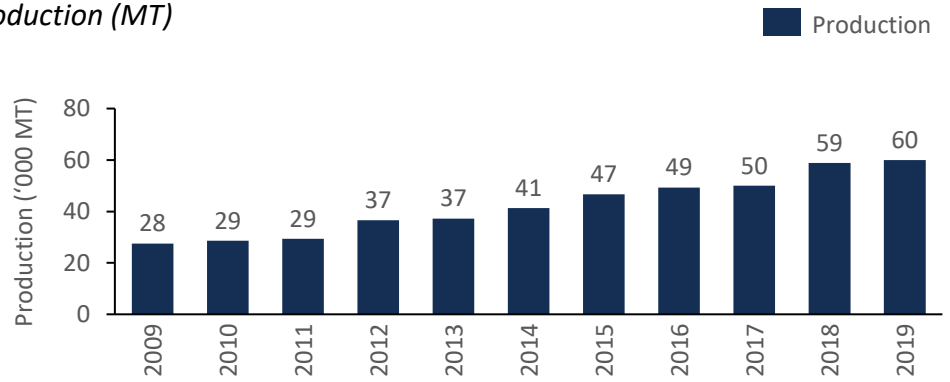
Macadamia kernel production by country (2019)[1]

Production (MT) and 5-year average production (MT)



Macadamia global kernel production[1]

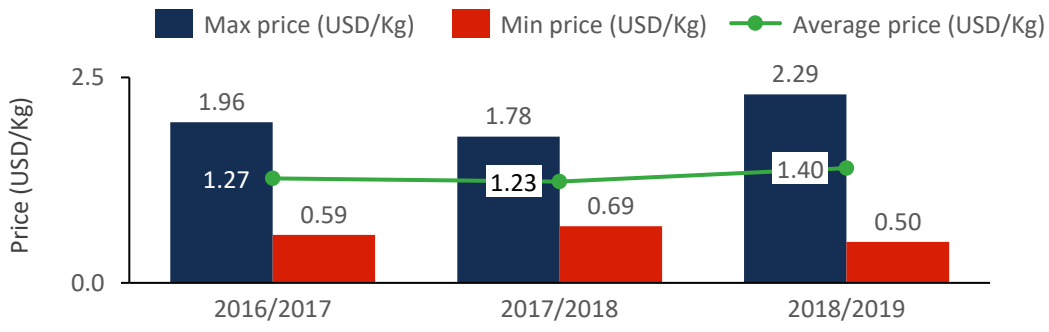
Production (MT)



Kenya has increased its competitiveness in terms of macadamia nuts exports

- Globally, Kenya is ranked the third largest macadamia nuts producer with a 5-year average share of c.13% of global production. South Africa and Australia have a share of 27% and 27% respectively[1].
- Lower kernel recovery rates continues to affect Kenya's ranking as a global macadamia nut producer. Kernel recovery in Kenya averaged 15% in 2019 compared to over 35% recovery rate in Australia, South Africa and Hawaii[2].
- Further, quality requirements of buyers of macadamia relating to the provision of fully mature nuts with consistent taste, color and size remain challenging for Kenyan producers[2].
- Due to high returns occasioned by high demand and labour efficient production, macadamia farming has potential to be extremely profitable for Kenyan farmers especially with cultivation of improved varieties[4]. However, earnings of Kenyan farmers are below those of farmers in South Africa and Australia where farm gate prices range between USD 3.90 and USD 5.86 per Kg[2].
- Fluctuating farm gate prices during the crop season in the country has been partly blamed on the presence of many intermediaries resulting in a poor market structure which eats into the farmers' revenue.

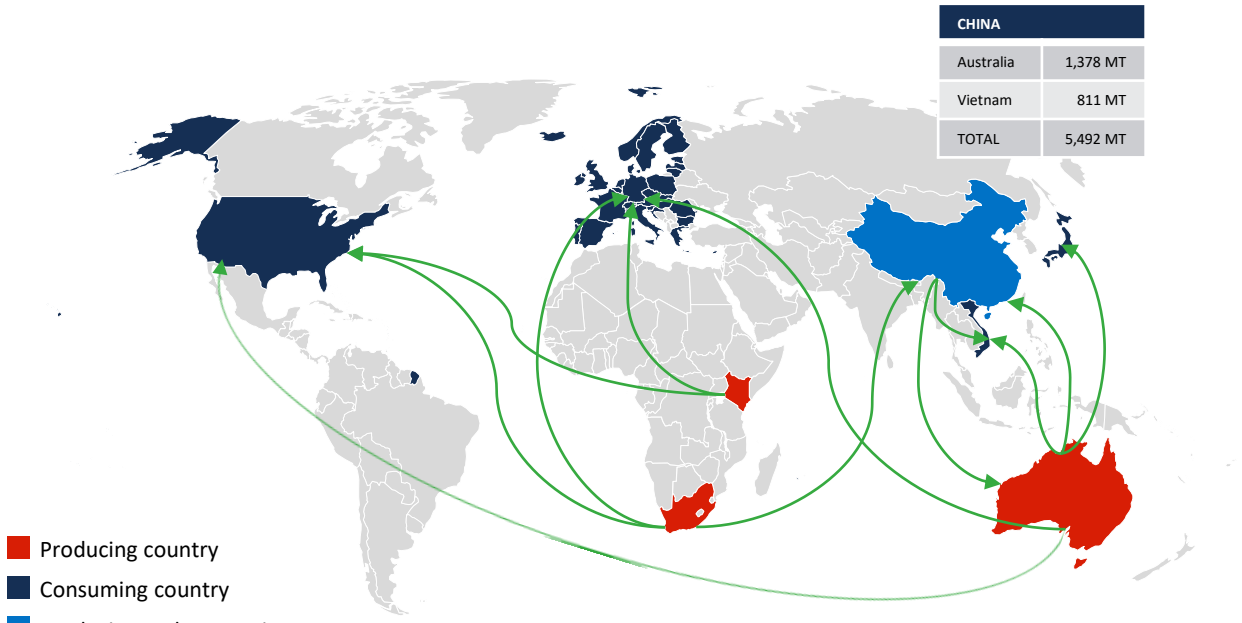
Macadamia nuts farm-gate price in Kenya[3]



Sources: [1]International Nut and Dried Fruit Council Foundation – Nuts and Dried Fruits Statistical Yearbook 2019/2020, [2]Profundo Research & Advice – Value Chain Analysis of Macadamia Nuts in Kenya (2019), [3]The Borgen Project – The Bright Future of Macadamia Nut Farming in Kenya, Rich Farm Kenya - Macadamia Prices in Kenya to Possibly Climb Over Ksh 200 Per Kg In 2020, AFA – Nuts and Oil Crops Statistical Reports 2017, 2018, 4 Tridge- The Increasing Presence of Kenyan Macadamias in the Global Market

Global macadamia demand

Europe, United States, Japan and China are the largest macadamia consuming markets, collectively accounting for 70% of the world's consumption. Demand is expected to continue growing.



CHINA	
Australia	1,378 MT
Vietnam	811 MT
TOTAL	5,492 MT

SOUTH AFRICA	
USA	3,135 MT
EU+EFTA	2,225 MT
China	1,673 MT
TOTAL	8,352 MT

KENYA	
USA	3,463 MT
EU+EFTA	1,300 MT
TOTAL	5,492 MT

AUSTRIALIA	
China	1,659 MT
Japan	1,316 MT
Vietnam	1,315 MT
EU+EFTA	687 MT
TOTAL	6,916 MT

Globally, the market for macadamia nut is characterized by increasing demand and limited supply resulting in a demand – supply gap for the nuts

- Demand for Kenyan macadamia nuts in the global market was on an upward trajectory until the impact of the COVID pandemic hit and prices dropped globally. Batian Nuts expects prices to return to their upward trajectory after the 2019/2020 season.
- Although the total impact of COVID is not certain at this point, global demand is expected to continue increasing, as the global macadamia market is estimated to expand at an average annual growth rate of 6.6% between 2020 and 2025 driven mainly by the nuts' health benefits and increased use of the nuts in food processing, cosmetics and personal care industries[3].
- Demand for macadamia nuts is generally influenced by irregular price changes on the supply side. Price increases reduce demand as macadamia nuts are considered luxury nuts with the highest price of all commonly consumed nuts in the market (macadamias are, on average, 50% more expensive than cashews and 6 times more expensive than peanuts)[4].
- Kenyan macadamia nuts produced in 2018/2019 were traded at USD 2.14/kg in the international market[2]. Kenyan macadamia nuts are competitive in the international market as they can be cheaper than the South African and Australian nuts which traded at between USD 3.88 – 5.82/kg in the 2018/2019 season[2].
- Despite the increasing demand trends, both globally and in Europe, it is generally not expected that the demand for macadamia will compete with the more dominant nut varieties like walnuts or peanuts. This is partly because consumers are not aware of the product but notably also because of its comparatively high price. Macadamia is expected to remain a niche product in the nut sector albeit with a growing market base[5].

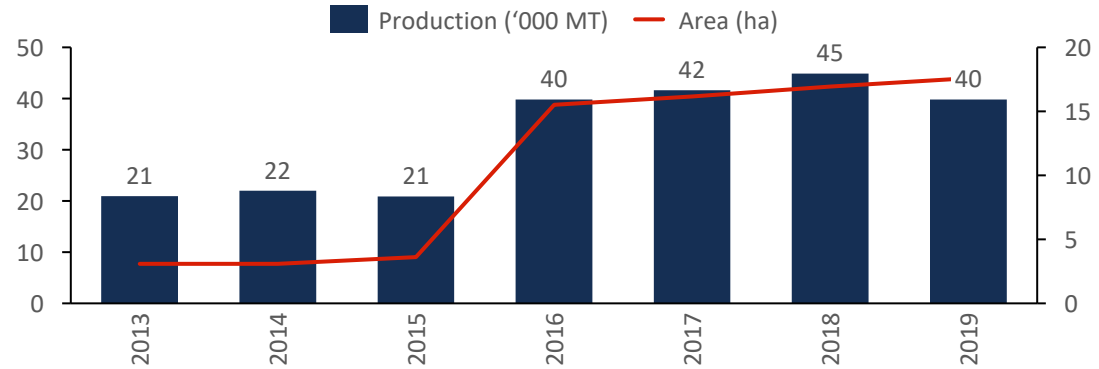
Sources: [1]International Nut and Dried Fruit Council Foundation – Nuts and Dried Fruits Statistical Yearbook 2019/2020, [2]Tridge- The Increasing Presence of Kenyan Macadamias in the Global Market, [3]Macadamia Market - Growth, Trends and Forecasts (2020 - 2025), [4]CBI Ministry of Foreign Affairs – The European market potential for macadamia nuts, [5]Profundo Research & Advice – Value Chain Analysis of Macadamia Nuts in Kenya (2019)

Kenyan macadamia market

The role of macadamia as a cash crop for foreign exchange earnings has steadily increased in recent years as global demand for the nuts outstrips supply

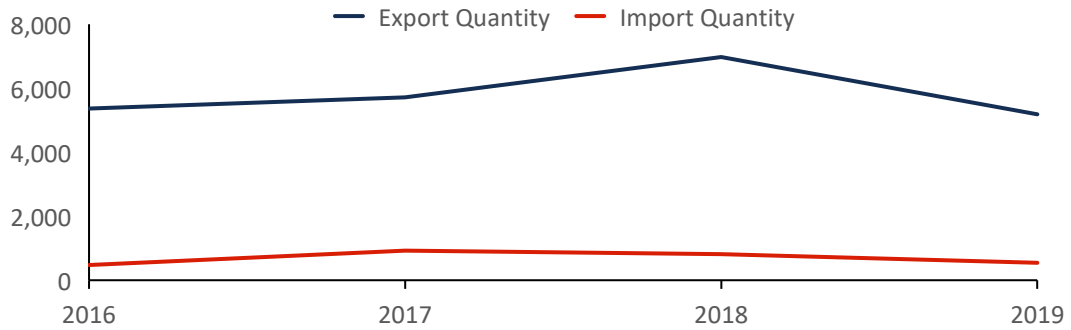
Domestic supply of macadamia nuts (in shell)[1]

Total macadamia nut supply ('000 MT) and production area (Ha)



Import and export volumes of macadamia nuts (kernel)[1]

Total volume of macadamia nuts import and exported per MT



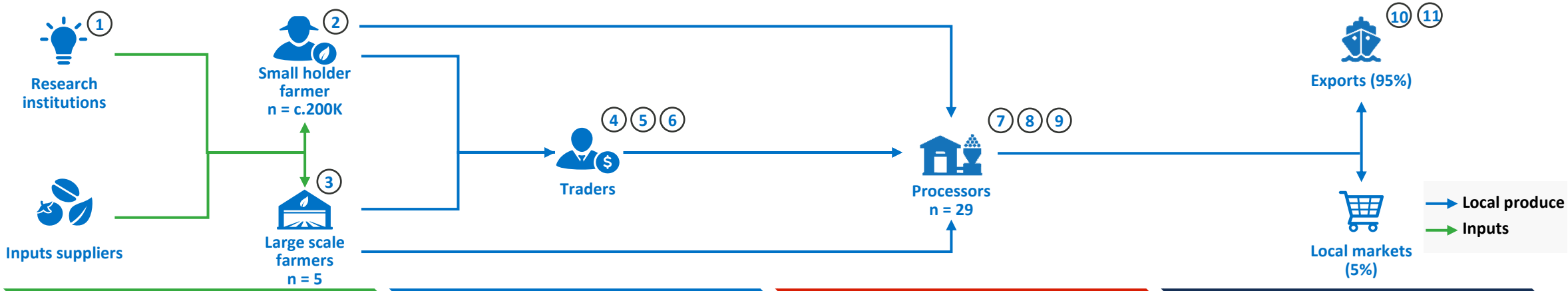
Macadamia offers an important source of income for producers worldwide and SHFs in Kenya

- Kenya's macadamia production has increased rapidly in the last decade mainly due to the expanding area under crop cultivation, higher productivity per unit area as well as expansion of the crop into new areas especially in the West of Rift Valley covering Uasin Gishu, Trans Nzoia and Bungoma counties[1].
- Although the country's macadamia production is on an upward trend, it is highly volatile with considerable year on year fluctuations in yield. Also, officially reported production figures may be lower than actual production due to smuggling of unshelled macadamia through neighboring countries for export to China[2].
- In 2019, productivity averaged 40kg per tree per year (2018: 30kg) for the mature bearing trees and 20kg per tree per year from recently established trees. This yield is low relative to the yield potential of about 70 – 100kg per tree per year depending on the clone. This low productivity points to poor agronomic practices at farm level[1].
- It is estimated that Kenya loses between 35 – 40% of its macadamia nuts harvest due to insect damage, premature harvesting and inappropriate storage conditions resulting in mold infection[1].
- Although Kenya is a net exporter of nuts, the country imports some nuts for local consumption and to bridge the raw materials deficit in her processing facilities[2].
- Between 90 and 95% of Kenya's macadamia production goes into export. Europe is a key export market for Kenyan macadamia driven mainly by the growing interest among EU consumers in food products with superior health benefits as well as natural cosmetics[2].

Sources: [1]AFA – Nuts and Oil Crops Statistical Reports 2017, 2018, 2019 and 2017 Statistical Yearbook, [2]Profundo Research & Advice – Value Chain Analysis of Macadamia Nuts in Kenya (2019)

Kenyan macadamia nuts value chain

The macadamia value chain in Kenya is highly regulated by the government and is predominantly trader driven



Production

1. Kenya Agricultural and Livestock Research Organisation (KALRO) coordinate research efforts and promote application of findings. Based on research, seed producers, under supervision of Kenya Plant Health Inspectorate Service (KEPHIS), produce certified seed.
2. Most small scale farmers produce less than 100kg of macadamia annually mainly due to poor GAP.
3. To have more control over the quality of nuts, large nut processors have set-up large orchards.

Aggregation

4. Traders are classified based on the role they play in the value chain: Small collecting agent who buy nuts in small quantities from farmers; collecting agents who buy from small agents (n = c.3,000); Agriculture and Food Authority (AFA)-licensed agents who buy from collecting agents (n = 100).
5. While collecting agents engage in trade as independent agents, AFA-licensed agents work on the basis of exclusivity contracts with processors.
6. There is a negative attitude towards traders in the sector as they are perceived to exploit farmers through pricing and deemed to encourage harvesting of immature macadamia.

Processing

7. AFA's listing recognises a joint installed capacity of 97,650 MT annually amongst the 29 macadamia processors in the region.
8. Apart from adding value to macadamia by processing it, processors also act as traders as they aggregate nuts through their buying stores where farmers come to sell their produce. Processors will mostly have several buying shops located in the nut growing regions across the country.
9. Most nut processors own (or rent) lorries to transport nuts from farms or buying stores to the processing plants. Further, large processors have their own fleet to transport processed nut to its port of export.

Markets

10. Kenya export destinations are mainly the United States, Europe, Japan, China, Hong Kong and Canada.
11. Export of macadamia nut in shell (NIS) from Kenya without written authorisation from the Government has been illegal since 2009. GoK aims for all macadamia grown in Kenya to be processed locally arguing that this would empower local processors, advance domestic value addition, secure jobs and increase farmers' income.

Swiss Confederation Federal Departement of Economic Affairs, Education and Research EAER State Secretariat for Economic Affairs SECO
Ministry of Foreign Affairs
DANIDA
UKaid from the British people
BILL & MELINDA GATES foundation

Source: Profundo Research & Advice – Value Chain Analysis of Macadamia Nuts in Kenya (2019)

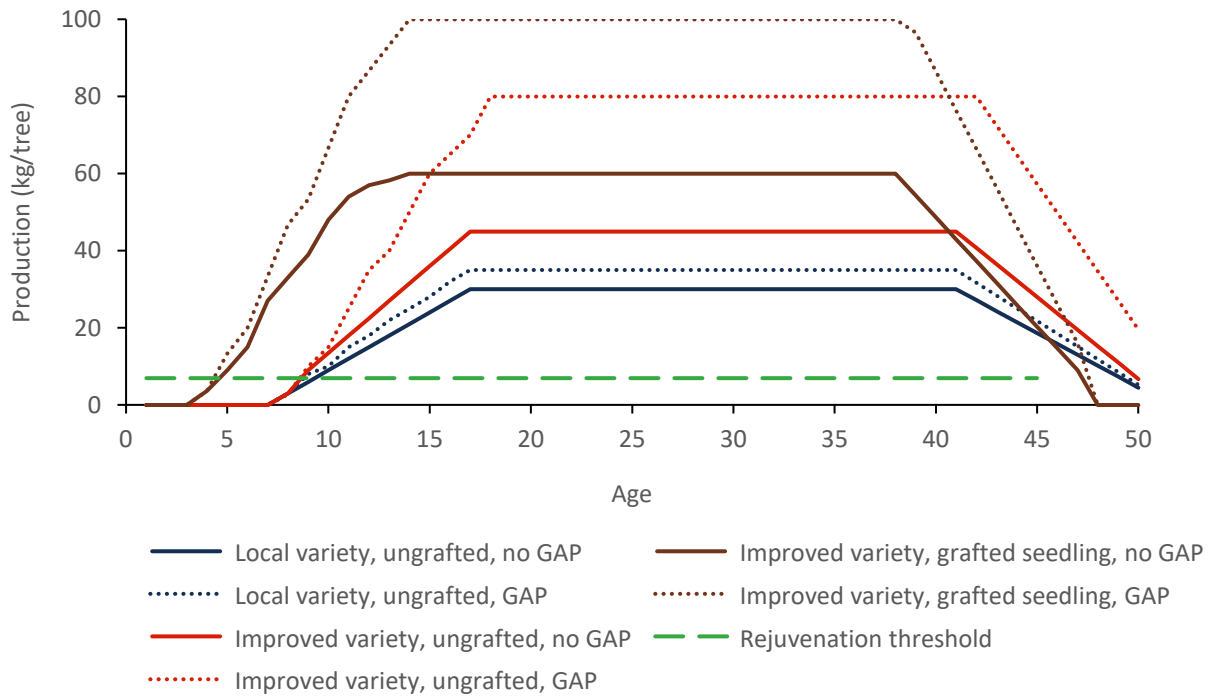
the sustainable trade initiative

Macadamia tree production

The potential of macadamia tree production remains largely untapped in Kenya due to limited adoption of GAP, grafting and rejuvenation of mature low bearing trees

Macadamia tree production over the years[1]

Annual production in kg per tree



Limits to Kenyan Macadamia tree production

- In 2019, macadamia tree productivity in Kenya averaged 35kg per tree per year for the mature bearing trees. However, with an improved variety and good agronomic practices at farm level the yield potential of macadamia trees could be between 70 – 100kg per tree per year[2].
- Non-grafted macadamia trees generally start bearing nuts after seven years, producing between 3 to 6kg in the first year. By the time the tree is five years, it can produce up to 35kg per season if GAP is applied[3].
- Grafted trees ensures the use of higher yielding clones and reduces the time to flower and thus produce macadamia nuts to only four years[4]. Likewise annual production quantity goes up to 100kg per tree.
- Good agronomic practices include periodical weeding the area around the tree and pruning macadamia trees after harvest to ensure the energy is directed to young and active bearing branches and to maintain a pre-determined size to ensure the sun can enter into the canopy[4,5].
- On average a macadamia tree reaches its peak at the age of 12 to 16 and it maintains peak production for 25 years.
- After the peak, tree production generally decreases with about 5-10% of total production until it is too little profitable for farmers to maintain. By top-grafting the macadamia trees over a five-to-ten year cycle the age of the tree can be prolonged.
- Macadamia farmers will remove the tree once production decreases to on average 10kg per tree[1].

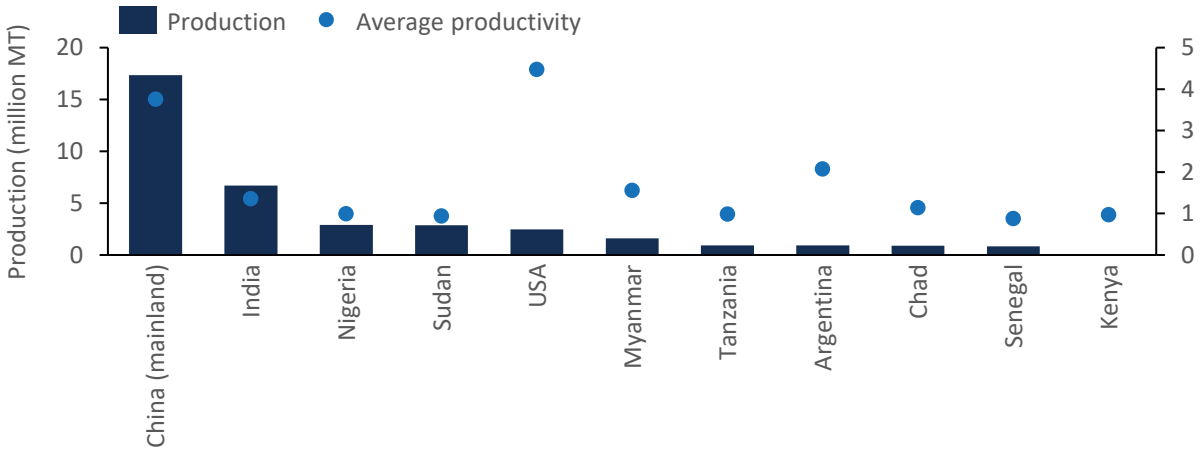
Sources: [1]BNL discussion. [2]AFA – Nuts and Oil Crops Statistical Reports 2017, 2018, 2019 and 2017 Statistical Yearbook. [3]Daily Nation Kenya – Nuts about Macadamia (2016). [4]KALRO Macadamia nut propagation (2019). [5]TheMacadamia (2018) shining a light on tree pruning.

Kenyan peanut supply

Low yields combined with declining land under cultivation and rising demand, makes Kenya a large importer of shelled peanuts

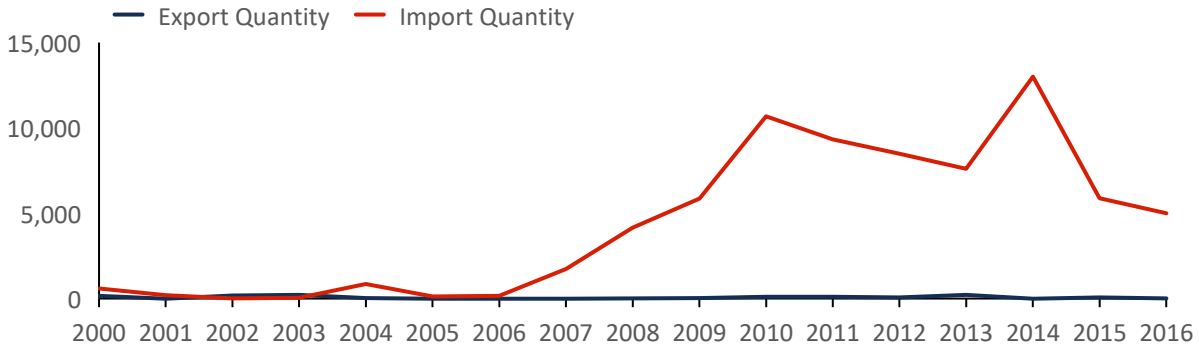
Kenya compared to top 10 peanut producing countries[1]

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



Import and export volumes of shelled peanut[1]

Total volume of shelled peanut import and export per MT



Domestic peanut demand outstrips supply

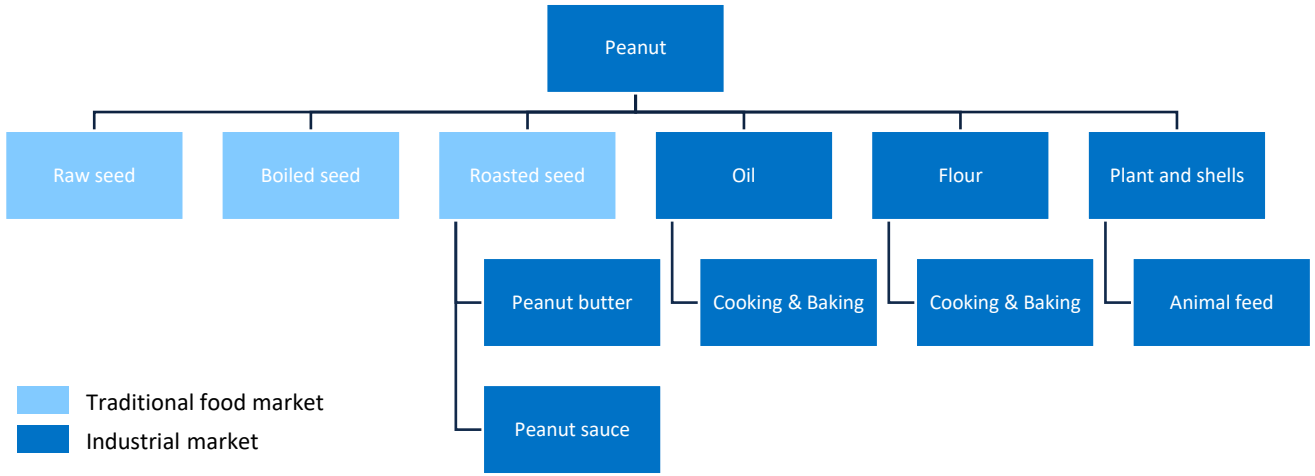
- In Africa, peanut yields are traditionally low, due to unreliable rains, little technology available to smallholder farmers, pest and disease occurrence and poor seed varieties (re)used by farmers[3].
- In Kenya continuous cultivation on decreasing land sizes and improper use of fertilizers has caused the yield to decrease further[2,3].
- In 2018 smallholder farmers registered peanut yields of about 0.97 MT per ha compared to potential yields of 2-3MT per ha[3].
- Despite that Kenya is experiencing burgeoning demand for peanuts, their low domestic production, has made them a large shelled peanut importer relying mainly on imports from Malawi and Zambia[2,3].
- Additionally, the risks associated with aflatoxin contamination have led industrialized countries to establish rigorous quality standards that often deny farmers and processors from developing country the opportunity to export[4].
- This not only demonstrates an opportunity to capture more value domestically by improving yields, increasing production volumes and adoption of good post-harvesting practices , but it also indicates a possibility for processors to capture additional value by shelling the peanuts domestically instead of importing shelled peanuts.

Sources: [1]FAOSTAT (2020). [2]Nuts and Oils Crops statistical report Kenya (2019). [3]ICRISAT (2016) Improved varieties and market linkages are the key: it pays to grow groundnut. [4]Farm Link Kenya – Groundnuts farming in Kenya (2017)

Kenyan peanut demand

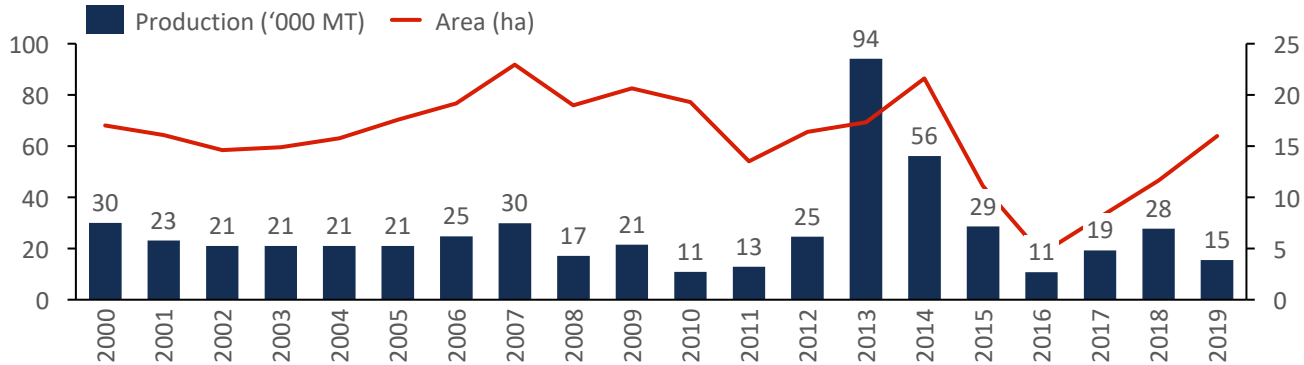
Peanuts are considered both a popular food crop and cash crop in Kenya, due to its high nutritious value and versatile use

Peanuts derivatives and their uses [1]



Domestic supply of peanuts (in shell)[2]

Total peanuts in shell supply per '000 MT and area



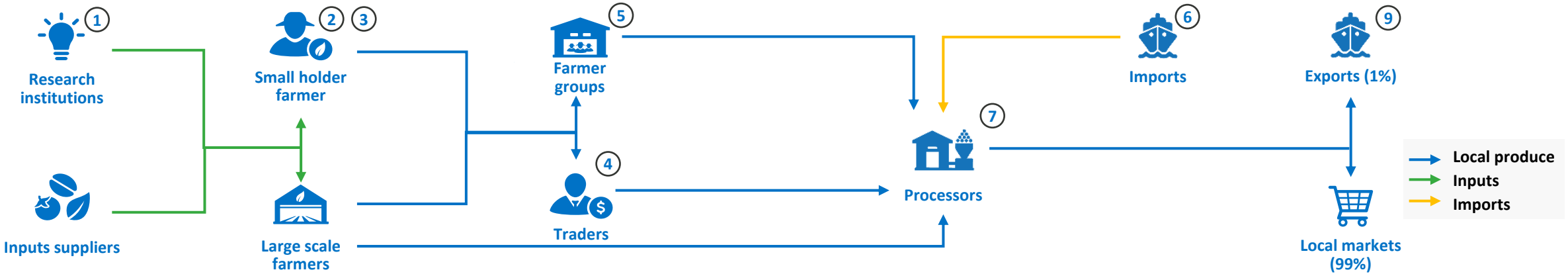
Peanuts in popular demand in traditional and industrial markets

- Peanuts are considered an important ingredient of the Kenyan diet and are the most popular amount other types of nuts because of their high nutritional value[1].
- The wide range of uses of peanut seeds, shells and the plant has supported the increasing demand for peanuts in the traditional food market but also in the industrial/processed food market as peanut butter or in confectionery[1].
- While the domestic demand for peanut has been increasing, the production has sharply decreased in the last ten years. Low productivity from local seed varieties, attack by pests and diseases, poor agronomic practices and low prices due to poor marketing channels have hampered increasing the area under peanut production[3,4].
- As peanuts in Kenya are mainly produced in western Kenya by smallholder farmers with limited access to certified seeds and agro-inputs and who apply poor pre and post harvest farming practices, there is a high prevalence of fungal contamination and aflatoxin accumulation in peanuts[5].
- Especially the presence of aflatoxin – which is extremely hazardous to human health – and the associated strict post-harvest practices and rigorous quality controls often disincentive smallholder farmers in investing in peanut farming[6].

Sources: [1]Developing a suitability model for optimized crop production - A case study of Groundnuts in Meru County (2014). [2]FAOSTAT (2020). [3]Nuts and Oils Crops statistical report Kenya (2019). [4]ICRISAT (2016) Improved varieties and market linkages are the key: it pays to grow groundnut. [5]UON – Assessment of locally cultivated groundnut varieties for susceptibility to aflatoxin accumulation in western Kenya. [6]Farm Link Kenya – Groundnuts farming in Kenya (2017)

Kenyan peanut value chain

There does not exist an organised marketing structure for peanuts in Kenya. This has lead to exploitation of farmers by middlemen in the country



Production

1. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has introduced new varieties of peanuts to replace the locally grown, small-seeded, low-yielding and disease prone varieties mainly used by Kenyan farmers[1].
2. Peanut production in Kenya is mainly by SHFs located in Western Kenya. The farmers have limited access to resources (certified seeds and agro-inputs) and apply poor pre and post harvest farming practices.
3. The bad state of infrastructure limits farmers' access to markets[1].

Aggregation

4. Market and pricing information asymmetry allow the brokers to collude against the interest of the farmers and to reduce prices from USD 0.90 to USD 0.50 per kg[1].
5. Farmers are coming together to form societies and groups with a view to cut out middlemen and maximise their profits[2].
6. Due to high aflatoxin contamination in locally produced peanuts, processors are opting to rely on imports from neighbouring countries to meet manufacturing requirements.

Processing

7. The costs and the post-harvest loss associated with shelling of the peanuts are high, making this a low-value adding farming activity[1]. Collaborating with an offtaker who also processes the peanuts would add additional value to both the farmers and the processor.
8. Processors import peanuts from Malawi and Zambia to plug the local production deficit.

Markets

9. The bulk of peanuts produced locally are consumed in-country. Aflatoxin contamination and acceptable levels continues to hinder internal peanut trade.

Source: 1) ICRISAT (2016) Improved varieties and market linkages are the key: it pays to grow groundnut,

Enabling environment (1/2)

The sector in Kenya is characterised by weak vertical integration, failing institutions and support services for agricultural exports

Definition	Situation	Impact on SDM
Technology	90% of Kenyan farmers aged between 18 and 35 have high levels of engagement with information and communication technology. They are active users of social media platforms and make use of digital financial services. This points at the potential of digital technology to revamp the agricultural sector[1].	Information and communication technology solutions hold great potential for removing inefficiencies in and transforming agricultural value chains. Batian Nuts leverages mobile technology to facilitate payments to farmers. Batian Nuts plans to roll-out an online system for interacting with farmers. The system will allow for sending of bulk messages and videos to farmers, organizing farmers for meetings and farmer field days and offering extension services.
Environment	Kenya is highly reliant on rainfed agriculture. Erratic rainfall, coupled with severe droughts, is the biggest risk facing Kenya's agriculture sector, with profound impact crop production. Pests and diseases are also a major concern. Improper use of agrochemicals continue to cause health and environmental issues[2].	Batian Nuts offers farmer training on GAP which promote proper agrochemical practices to avoid pests and disease and to increase farmer productivity while reducing soil degradation.
Infrastructure	Poor infrastructure including poor rural roads, markets and transport systems that result in high transactions costs for farmers and inaccessibility to input and output markets remain key concerns for farmers in the agricultural sector[3].	Majority of the macadamia buying centres are located in well serviced areas with proper transport infrastructure. However, this is not the case for peanut buying centres. Lack of proper infrastructure affects seamless delivery of services and inputs to the farmers. Further, this could result in high transportation costs incurred in transporting produce from the farm to the processor. Batian Nuts has invested in own trucks for use in transporting of produce
Labor	The Kenyan economy is characterised by a large share of jobs in the informal sector including small scale farming. These constituted 83.6% of total employment in the country in 2018. Most workers in macadamia processing units are hired seasonally and are often paid as low-skilled labour. The monthly basic minimum wage for unskilled labour in the agricultural sector is KES 6,736 (USD 67)[4].	Batian Nuts pays its casual laborers a minimum monthly wage of [redacted] which is notably above the minimum wage.
Inputs & Financing	The Kenya nut sector is marked by low levels of mechanization, lack of access to inputs and extension services[1]. Only 4% of the Kenya's total credit is channelled to agriculture. Lack of collateral to access credit has resulted to poor inputs access, low productivity and low income for the SHFs[5].	Batian Nuts actively seeks to identify MFIs to finance farmers thus enabling them access inputs and services. Batian Nuts offers farmers high-quality macadamia seedlings and peanuts seeds and links farmers with recognized agrochemical input providers.

Sources: [1]Profundo Research & Advice – Value Chain Analysis of Macadamia Nuts in Kenya (2019) , [2]World Bank – Kenya: Agricultural Sector Risk Assessment, [3]FAO – Agricultural Policies in Kenya: Issues and Processes, [4]KNBS – Economic Survey 2020, [5]Center for Financial Inclusion, [6]Africa research institute

Enabling environment (2/2)

Technology led agriculture has potential to improve food security and alleviate poverty in the country

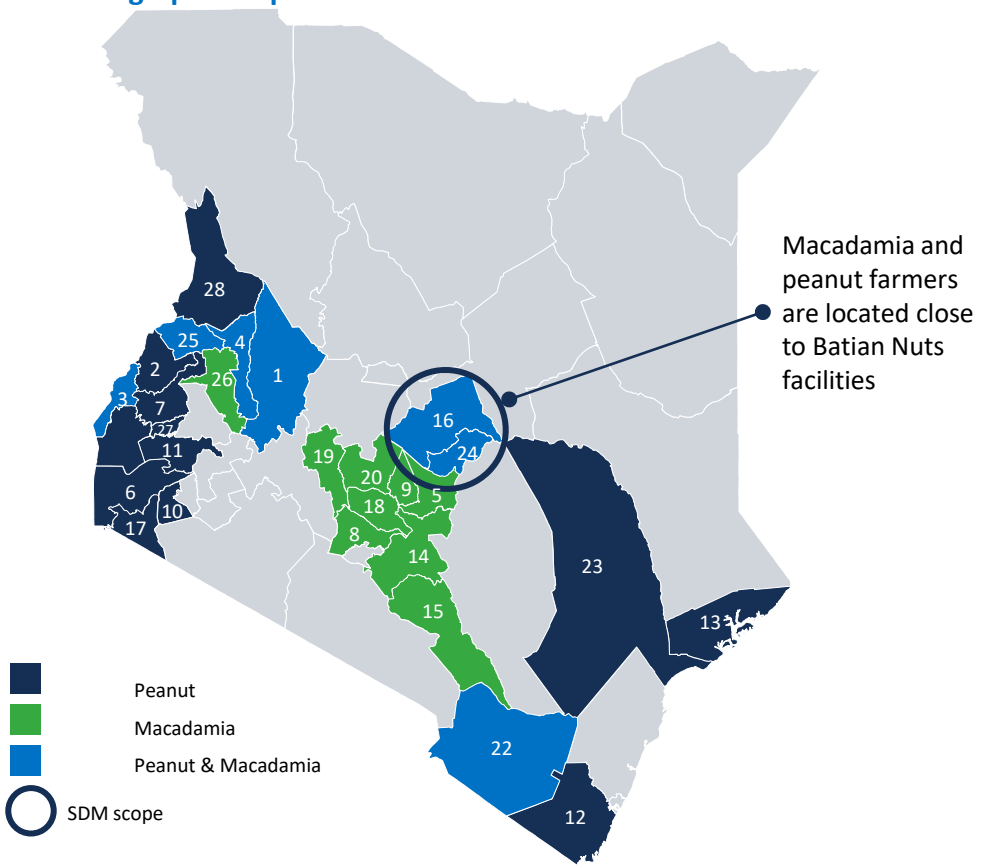
Definition	Situation	Impact on SDM
Trading System	The Nut Processors Association has drafted a law to streamline the farming, harvesting and marketing of nuts in Kenya. According to processors, nut quality has been increasingly compromised by unscrupulous brokers and traders[1]. Brokers have also been accused of exploiting farmers and holding the sector hostage through setting prices given the sector is mainly trader driven[1].	Batian Nuts sources directly from farmers thus eliminating the need for brokers.
Pricing & Competition	Speculation and price volatility pose great risks to the nut sector and make the sector unattractive for banks wanting to lend to entrepreneurs within the sector[1].	Macadamia nuts prices are highly volatile particularly within a given year. These fluctuations pose a price risk to Batian Nuts as higher than average farm-gate prices could erode their profitability.
Institutional Stability	Kenya has made significant political, structural and economic reforms that have largely driven sustained economic growth, social development and political gains over the past decade[2]. These reforms have resulted in the country's stable institutions.	Government organizations such as KALRO continue to support farmer efforts through coordinated research on inputs particularly high yielding seed varieties.
Land Tenure	Costs related to registering land and acquiring titles are too high for most SHFs. Consequently, majority of rural SHFs do not hold title deeds proving them as the rightful landowner[6]. Women, who are key players in the agricultural sector only hold 1% of all registered land in Kenya in sole name and only c.6% in joint names with a man. This is as a result of the patriarchal land system[1].	Land tenure is not a challenge in the region where Batian Nuts operates as the majority of the land is legally titled. This eases the process of transferring land from one party to another.
Social Norms	In Kenya, women are highly involved in the agricultural workforce, though, mostly in food production as this is a generally, low-earning farming activity. This is in addition to their traditional domestic responsibilities[6]. Women's access to schools and healthcare is limited[6].	Although women are more involved in farming than men, farm returns are shared with the men. Women are involved in all stages of nut production including production, planting, transplanting, harvesting etc.

Sources: [1]Profundo Research & Advice – Value Chain Analysis of Macadamia Nuts in Kenya (2019) , [2]World Bank – Kenya: Agricultural Sector Risk Assessment, [3]FAO – Agricultural Policies in Kenya: Issues and Processes, [4]KNBS – Economic Survey 2020, [5]Center for Financial Inclusion, [6]Africa research institute

Farmer base

Nut farming in Kenya is characterized by mixed cropping

Geographical spread of farmers



Area under crop production (Ha) - 2019[2]			
#	County	Macadamia	Peanuts
1	Baringo	202	75
2	Bungoma	-	644
3	Busia	184	670
4	Elgeyo Marakwet	106	5,109
5	Embu	2,811	-
6	Homa Bay	-	4,132
7	Kakamega	-	1,322
8	Kiambu	2,046	-
9	Kirinyaga	1,731	-
10	Kisii	-	201
11	Kisumu	-	932
12	Kwale	-	53
13	Lamu	-	89
14	Machakos	335	-
15	Makueni	101	-
16	Meru	2,823	529
17	Migori	-	814
18	Muranga	4,670	-
19	Nyandarua	322	-
20	Nyeri	1,002	-
21	Siaya	-	520
22	Taita Taveta	179	26
23	Tana River	-	11
24	Tharaka Nithi	594	96
25	Trans Nzoia	121	56
26	Uasin Gishu	92	-
27	Vihiga	-	560
28	West Pokot	-	72
29	Others	270	54
	Total	**17,589**	**15,965**

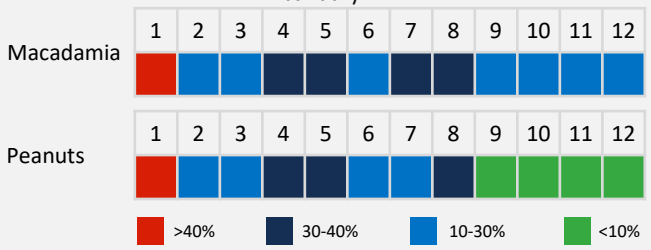
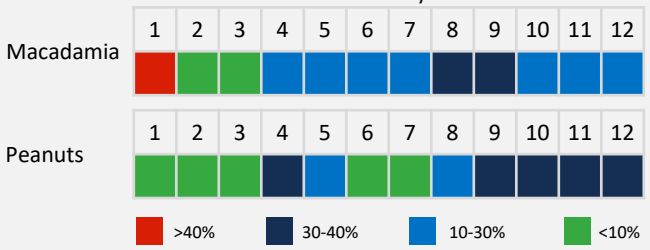
- Macadamia production in Kenya is dominated by smallholder farmers. More than 100,000 mostly small-scale farmers are cultivating the trees primarily in mixed cropping with coffee and other products. Larger producers and contract farming arrangements are the exception[1].
- Macadamia nuts grows well in high altitude areas (between 1,500 – 1,850 M) and are more tolerant to cold weather[2].
- The highland regions around Mount Kenya with rich volcanic soils, known for the country's high-quality coffee production, are the biggest producers of macadamia[1].
- In the central region of Kenya, intercropping of macadamia with bananas, coffee and maize is a common practice. Macadamia trees used to be grown by farmers to shade their coffee bushes or act as windbreakers. However, farmers are increasingly abandoning coffee and turning to macadamia production due to better returns[1,2].
- Peanuts are mainly cultivated by smallholder farmers, both for intake of nutritious food and sales.
- Peanuts are predominantly grown in most parts of Western Kenya and Nyanza regions. Homa Bay is the highest producer of peanuts accounting for 27% of the country's production followed by Elgeyo Marakwet where the crop is now being grown on a commercial scale to supply to processors[2].
- Unlike macadamia nuts, peanuts grow well in warm tropic and sub-tropic regions of below 1,500 M[4]. The varying ecological requirements make it difficult to intercrop macadamia and peanuts.
- Tharaka Nithi County is generally a low land region, with an altitude ranging between 250 and 1,500 M. This make the region suitable for peanut farming[5]. On the other hand, Meru County is divided into four agro ecological zones ranging from upper highlands to lower midlands. The cooler altitude makes the region ideal for macadamia farming[6].

Sources: [1]Profundo Research & Advice – Value Chain Analysis of Macadamia Nuts in Kenya (2019), [2]KALRO – Macadamia Nut Propagation (2019), [3]AFA – Nuts and Oil Crops Statistical Reports 2017, 2018 and 2019, [4]Farm Link Kenya - Ground nuts Farming in Kenya, [5]CGIAR - Climate Risk Profile Tharaka Nithi County, 6CGIAR - Climate Risk Profile Meru County

Food Security

Approximately 1.3 million people in Kenya are currently facing acute food insecurity

Farmer's overall Food Security status

Category	Cash-flow (Stability & Access)	Food Security (Access & Availability)	Assets (Stability)
Score	**Average risk**	**Average risk**	**Low risk**
Data	**CASH FLOW** % of farmers that expressed that they are cash-strapped during this month of the year. Farmers are most cash-strapped in January 	**FOOD SECURITY** % of farmers the expressed that they face food shortages during this month of the year. Farmers are most food insecure between October and January 	• **Ownership:** 99% of the macadamia and 90% of the peanut farmers own the land on which they farm • **Average farm size – macadamia:** 1.83 acres • **Macadamia nuts farm size:** 0.63 acres • **Average farm size – peanuts:** 3.65 acres • **Peanuts farm size:** 0.87 acres • **Animals:** 60% of macadamia and 58% of peanut farmers own livestock. Livestock reared is primarily cows by macadamia farmers (81%) and chicken by peanut farmers (8%).

Category	Income (Access & Availability)	Market (Availability)	Health & Sanitation (Utilization)[1]
Score	**Average**	**Average**	**Average**
Data	• **Nuts sold:** 98% of macadamia & 92% of peanut produce is sold • **Crop loss:** Macadamia – 1% & peanuts – 3% of peanut • **Own consumption:** Macadamia – 1% & peanuts – 5% • **Price:** Macadamia – c.76 KES/kg and peanuts – c.107/kg • **Price volatility: Macadamia:** high; **Peanuts:** low • **Income from crop:** Macadamia – 41% **& Peanut** – 36% of total income • **Other crops & livestock income:** Macadamia – **32**% & Peanut – 36% • **Off-farm income:** Macadamia – 27% & peanuts – 28% • **Poverty line:** Poverty line is USD 319/individual/year • **Household size:** 5 people	• **Per capita food production variability:** 5.8[1] • **Global production**: Kenya is a net exporter of nuts. The country is ranked third worldwide in macadamia production. Peanut production in the country is low. • **Export vs Import:** Kenya is a net exporter of nuts. The country exports c.95% of its locally produced macadamia and 1% of peanuts. • **Local market:** The local market is driven by brokers who aggregate nuts from SHFs. Unscrupulous practices by brokers and processors (including miscalibrated weighing scales, pricing exploitation) persist.	• **District level nutrition status:** On average, 11.8 million Kenyans are undernourished. The prevalence of stunting among children under five years if age is 26.2% nationally. • **National average dietary energy supply adequacy:** 97% • **Access to clean water:** Yes. At least 58.9% of Kenyans have access to basic drinking water services • **Access to sanitation:** 29.1% of the population has access to at least basic sanitation services

Sources: All data from farmer PDC except specified otherwise, [1]FAO,

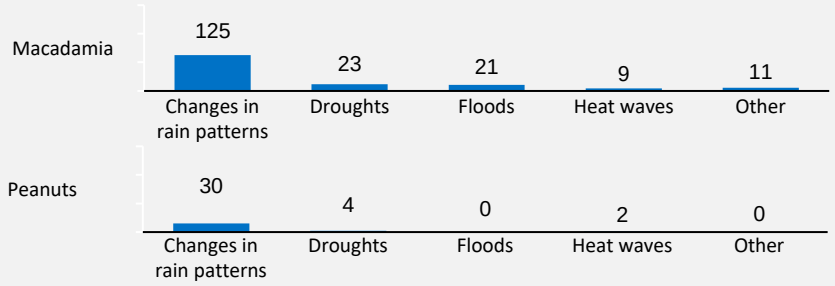
Climate Resilience

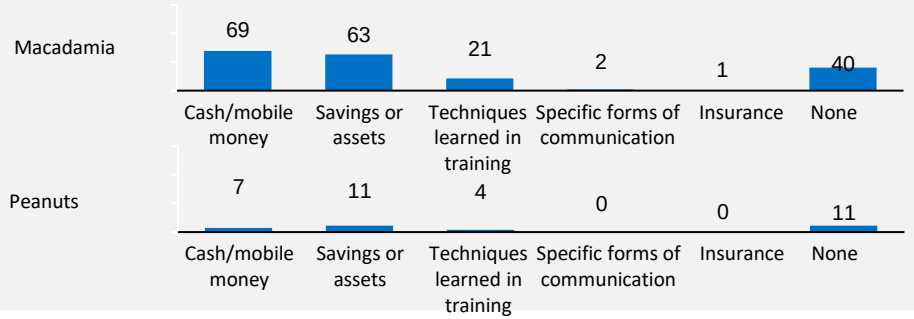
Kenya is assessed to be low in climate resilience. Investing in climate smart agricultural practices could help farmers in dealing with climatic shocks

Farmer sensitivity and exposure to	Exposure	Detailed description of risk	Sensitivity	Expected impact
Changing temperatures	**Medium risk**	• Kenya has experienced increasing temperature over the last 50 years. Future climatic predictions for Kenya indicate possible annual temperature increase of 2.3^{0}C by 2050[1].	**Severe**	• Increased prevalence of pests and diseases and emergence of new ones • Water stress due to droughts will affect yield
Changing rainfall patterns and soil conditions	**High risk**	• Kenya is experiencing changes in the distribution, onset and cessation of rainfall seasons thus making it increasingly difficult to plan agricultural operations[1]. • Further, improper use of fertilizer has resulted in soil degradation.	**Severe**	• Decrease in the reliable cropping days and higher incidences of crop failure • Low soil fertility causes yields to decline
Frequent climate extremes	**Medium risk**	• Meru and Tharaka Nithi counties have been experiencing deteriorating climatic conditions due to climate changes. The intense extreme weather events like droughts and floods will become more frequent[1,2].	**Average**	• Water stress due to droughts will affect yield • Floods can destroy crops, erode the soil and limit farm and market accessibility

Farmer adaptive capacity

Category	Climate issues faced	Coping mechanisms
Data	• 97% and 53% of peanut and macadamia farmers respectively experienced crop losses due to extreme weather events • Peanut farmers did not report floods as an issue resulting in crop loss	• 26% of macadamia and 30% of peanut farmers have no adaptation strategy to cope with crop loss as a result of extreme weather • No peanuts farmers reported to have used insurance to minimize crop loss



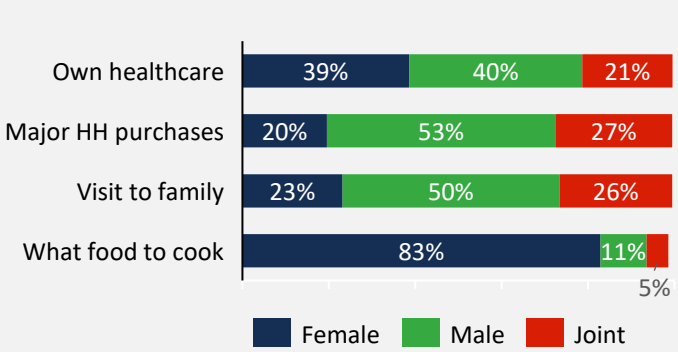
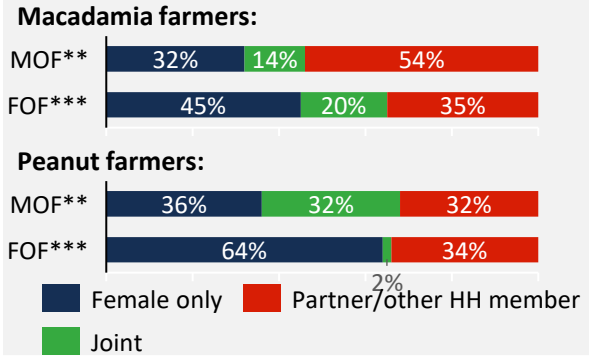
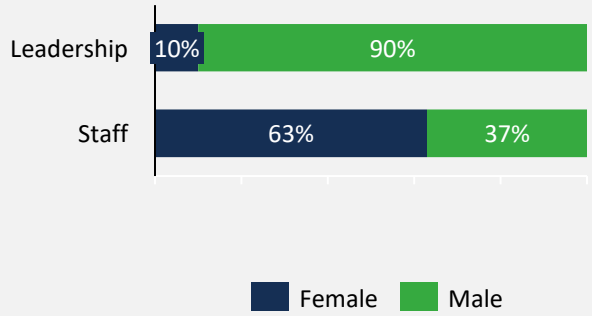


Sources: [1]Kenya Agriculture Climate Smart Agriculture Implementation Framework (2018 – 2027), [2]ThinkHazard – Meru and Tharaka Nithi counties

Gender

Although women play a key role in the agriculture sector, their decision-making influence remains limited, as does their representation in leadership positions

Gender Dynamics:

Category	Decision making[1]	Decision making on productive activities	Women in Leadership
Data			

Category	Description of involvement	Detailed description of risk	Expected Impact
Involvement in household Activity	**Activities undertaken:** • 97% of the women are involved in household activities such as cooking, cleaning, fetching water, washing clothes or buying food • 55% of the women are involved in buying clothes for the household • 54% of the women care for school going children while 37% care for an ill household member	• Disproportionate load of unpaid care work • Limited time to engage in productive/economic activities and in training on GAP (time poverty)	• Women's exclusion in effective participation in agricultural value chains • Lower farm yields • Unsustainable agricultural value chains
Involvement in Farm Activity	**Activities undertaken:** • In peanut farming, women are mainly engaged in crop maintenance (89%) and planting or transplanting (74%) • In macadamia farming, 69% and 68% of women in the HH are involved in crop maintenance and harvesting activities respectively • c.22% of the women are involved in crop protection application in both peanut and macadamia farms	• Uneven agricultural value distribution where women focus on poorly remunerated activities i.e. planting, crop maintenance, crop protection application and harvesting	• Role of women invisible in agricultural value chains • Unequal distribution of value along the agricultural value chain

*Female **Male-operated farms ***Female-operated farms, [1]KNBS (2014): Demographic and Health Survey

Gender

Gender inequalities affecting particularly rural women employed in the agriculture sector still exist in Kenya

Enabling environment

- Gender disparity in primary education has been eliminated, with current enrolment **slightly in favor of women**.
- In ownership of a bank account, there is a gender disparity of 0.89. This is **close to the global average of 90**.
- On average, 54% of women state they have an opinion or ability to take part in decision-making; this is **significantly below** their male counterparts.

*Primary education enrollment * [1]*	**1.04**
*Owner of a bank account or used a mobile money service in the past year * [2]*	**0.89**
*% of married women who participate in decision-making ** [3]*	**54%**

Legend
Male
Female
Gender ratio (Female/Male)[1]

Comparison of BNL to the national context

Batian Nuts is **potentially gender transformative.** It takes a data driven approach to understand the needs and preferences of its farmers and tailors its delivery model to ensure women's access to productive assets (skills/inputs). It could further strengthen its service delivery model to ensure women's control of resources, develop KPIs to monitor gender journey and have a written down gender strategy to map its gender vision.

Overall its employee ratio has more than 50% of women employed. Notably, there are few women in leadership positions, this can be further strengthened by encouraging women's leadership.

The farmer distribution of peanut farmers is similar the the national proportion. Notably, men are more concentrated in Macadamia farming, which has more commercial value.

	Kenya	BNL
How does Batian Nuts's ratio of female to male employees compare with the country labor force participation?[1]*	**0.92**	**1.69**
How does Batian Nuts' proportion of female to male farmers compare with the country-wide farmer distribution?[4]	54% 46%	40% 60% Macadamia 60% 40% Peanuts
How do the incomes earned by Batian Nuts' employees compare with the incomes earned by women and men in the country?[1]*	**0.70**	**0.52**
From the total female employees, what percentage are in middle to senior management?[1]*	**0.33**	**0.11**

*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

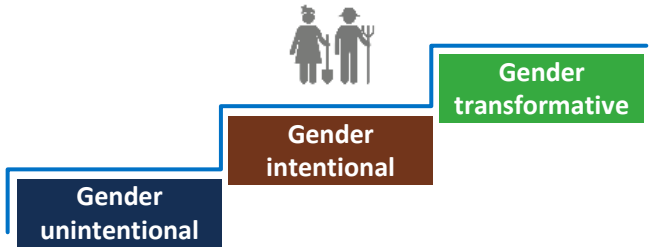
Sources: [1]World Economic Forum: Global Gender Gap report (2020); [2]World Bank (2017): Global Findex; [3]KNBS (2014): Demographic and Health Survey; [4]International Journal of Humanities – Women and Agriculture in Rural Kenya

Back to Recommendations

Gender deep-dive: becoming gender transformative

Batian Nuts could further benefit from implementing inclusive policies and services while lifting key barriers to women economic empowerment

Where is Batian Nuts in its gender journey?



Best practices to implement

- **Write gender strategy for clarity on goals and agenda.** Establish KPIs (ex. targets on the number of male and female farmers you are aiming to reach), develop a roadmap to get there and allocate resources to monitor and measure gender goals.
- **Develop a process of capturing, reporting and disseminating** generated **knowledge and learnings** on gender.
- **Use sex disaggregated data** on needs and preferences **to enhance productivity levels** by designing the service model to reflect this.
- **Recruit women in groups** that are already self organized. Foster women's leadership-by encouraging the leaders of the women's groups to be lead farmers.
- **Contract women peanut farmers and young women farmers** (not households) to foster and solidify loyalty while empowering.
- **Foster the use of mobile money transfer to women.** This ensures autonomy, control of their income, and bolsters financial resilience.
- **Propose alternative credit scoring mechanisms** to financial institutions to foster women's bankability.

Gender intentional

- **2Scale collaboration:** Youth and female peanut farmers are targeted in the farmer recruitment strategy.
- Using existing **women leaders** to attract more female farmers.
- **Supporting female-led farmers groups.**
- Applying an aspired **ratio of 50% female macadamia and 60% female peanut farmers**.

Barriers to be lifted

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

Benefits to Batian Nuts in becoming gender transformative

- Using existing women leaders to attract more women is an **effective farmer recruitment strategy.**
- Adapting training to women's capacities, literacy rates, time schedules and location leads to **improved yields and quality of produce**[1].
- Recruitment of women's groups is more likely to foster **higher loyalty levels** and **increased bankability**[2].
- Women's financial resilience is beneficial in household and community resilience and **fosters stable market and constant supply** chains[3].
- **Higher probability of attracting impact finance**

[1]Suri, T., Jack., W., (2016)., The long run poverty and gender impacts of mobile money; [2]IFC (2017)., Investing in women along agribusiness value chain; [3]Davies, M. Baars, M., (2017)., Link-up business case insights: Retrospective learnings from offering bank accounts to savings groups in Tanzania and Kenya.

2. STRATEGY

Understanding the SDM's strategy and business model

Strategy

COVID-19 requires Batian Nuts to reconsider its short and mid term strategic priorities, but its long-term strategy still holds

Goals & Aspirations

- Batian Nuts aspires to become market leader in sourcing, processing and sales (local and international) in edible nuts in Meru and Tharaka Nithi counties by 2025
- Batian Nuts principally processes and exports macadamia nuts today
- Batian Nuts aims to build a processing factory in 2022 for processing peanuts as well as cashew nuts further in the future

- **Portfolio aspirations for 2023:**
  - ✓65% macadamia (65% for export)
  - ✓20% peanuts (for domestic market)
  - ✓15% cashew nuts (for export)

- **Growth aspirations for 2023*:**
  - ✓44% macadamia farmers
  - ✓37% peanut farmers
  - ✓9% cashew nut farmers

Where to Play

Before COVID-19:
- **Diversification:** Set up peanut processing factory (2020) & expand into cashew nuts in coming 2 years
- **Growth:** Strong growth in sourced and processed volume

After COVID-19:
- **Diversified market:** Main focus remains on international export, however to reduce dependency Batian Nuts simultaneously increases their focus on products for which there is a local or regional market
- **Postpone CAPEX spending for peanuts:** Rather than setting up the peanut processing facility in 2020, Batian Nuts will postpone it to 2022 and instead capture other value-adding activities in the peanut value chain that require lower initial capital investments

How to Win

Points of Differentiation
- **Aggregate volumes for export**: Batian Nuts joined Afrimac as a strategic partner in 2019 and as such can pool its macadamia volumes and share costs for export with other local and professional macadamia processors.
- **Pricing:** By removing middlemen and sourcing directly from farmers, Batian Nuts can offer competitive prices
- **Farmer proximity:** Batian Nuts can maintain a close relationship with their farmers because they are continuously in face to face contact with the farmers

Points of parity
- **Quality standards:** Batian Nuts as well as its competitors need to comply with strict quality standards for macadamia and peanuts to maintain certifications guaranteeing quality to their customers

Capabilities Required

Critical capabilities
- **Agility:** In times of crisis be able to (temporarily) adjust business model towards more promising markets
- **Farmer contact:** Ability to compete with established competitors by providing relevant services at competitive prices, including efforts to reduce theft and timely payment
- **Guaranteed quality:** Batian Nuts needs to continuously comply with strict quality standards to maintain certifications guaranteeing quality to its customers. Especially the assurance of selling aflatoxin-free peanuts is critical

Supporting capabilities
- Access to external financing:
  - Capital for CAPEX investments
  - Working capital

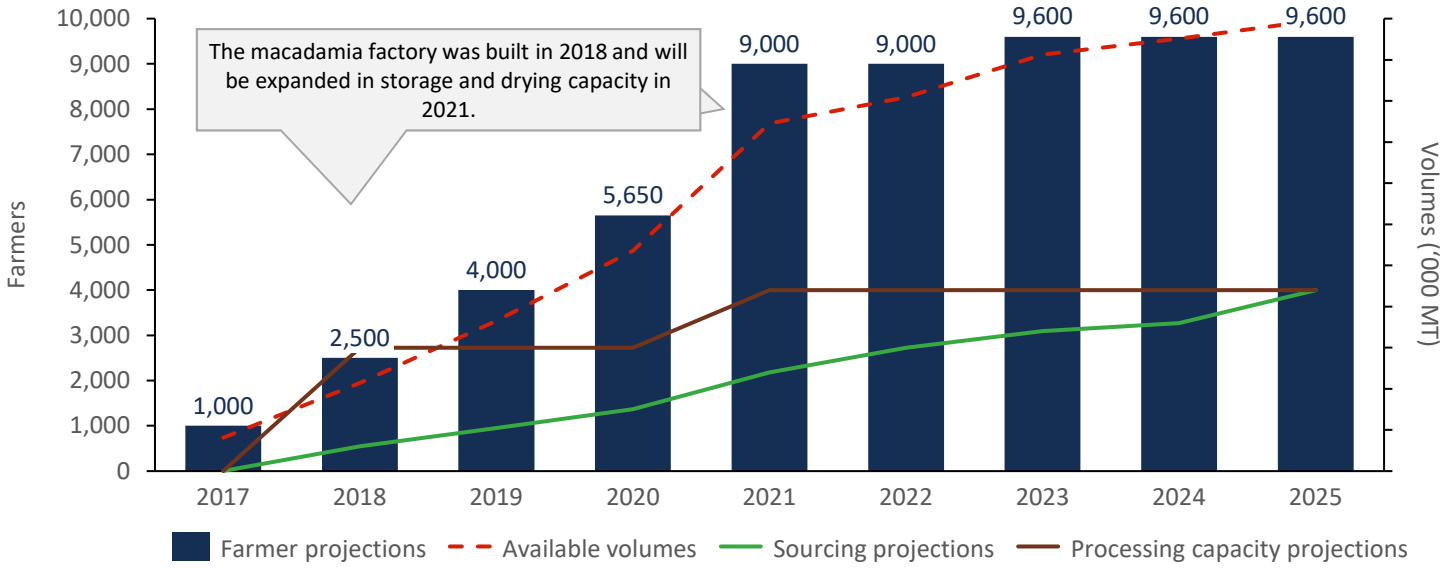
* These growth aspirations reflect Batian Nuts' original numbers. The farmer onboarding trajectory was challenged and adjusted in the course of this SDM analysis so the numbers used for the modeling are lower, see the growth trajectory descriptions for macadamia and peanuts.

Macadamia growth: farmers, volumes and processing capacity

Batian Nuts needs to source only a low average portion of farmers' marketable surplus to operate its macadamia plant at full capacity

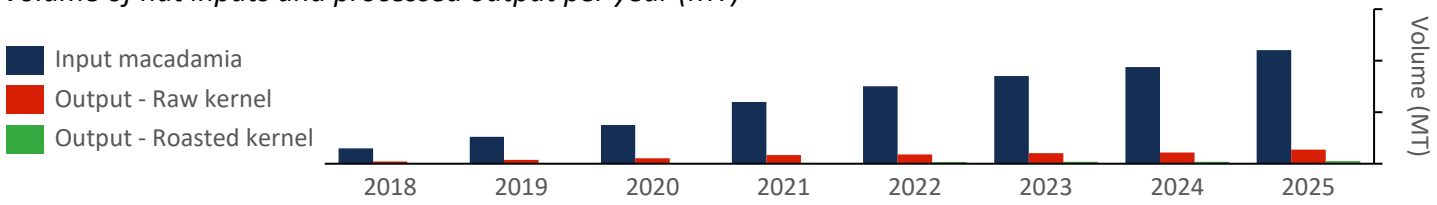
Macadamia volumes

Projections of farmers, volumes and processing capacity, from 2017 to 2025



Volume of processed macadamia nuts

Volume of nut inputs and processed output per year (MT)



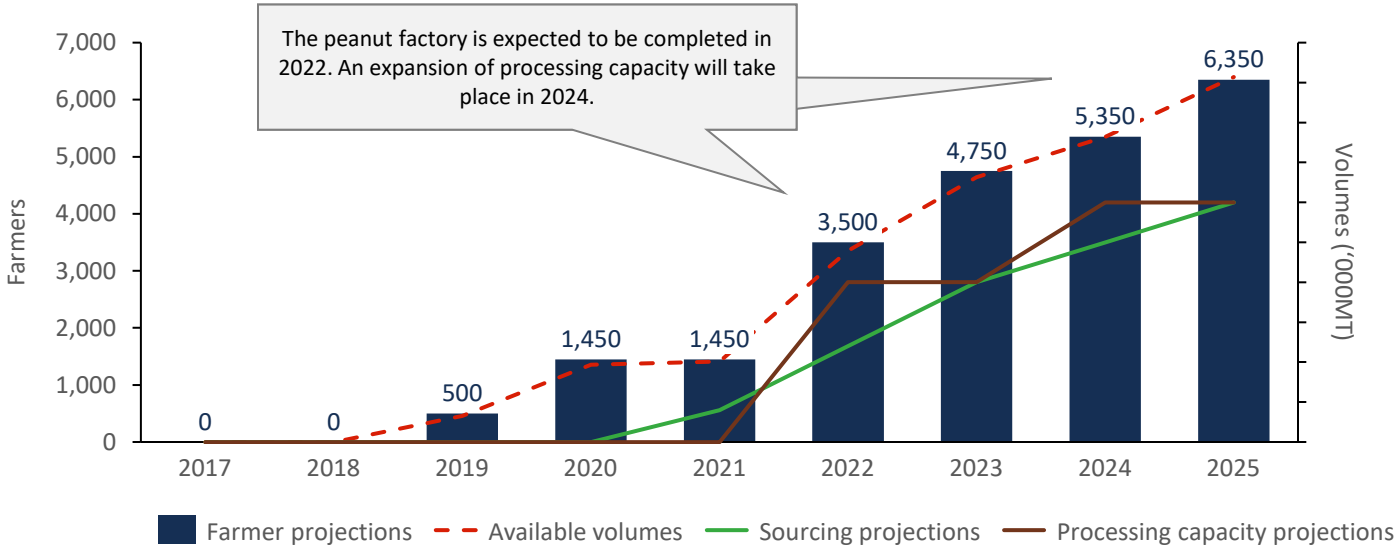
- Batian Nuts constructed a macadamia processing factory in 2018 with a maximum processing capacity of [redacted] MT and plans to increase processing capacity to [redacted] MT.
- As the macadamia processing capacity is constrained by the available drying and storage capacity, Batian Nuts plans to expand its current drying capacity and invest in an additional warehouse to house the additional dryers, boilers and heat exchangers.
- In a trajectory towards operating at full capacity, Batian Nuts aims to source [redacted] MT of macadamia nuts by 2025 from [redacted] farmers. This represents only a small average portion of the total marketable surplus that is expected to be available from these farmers: [redacted] MT sourced of [redacted] MT available volume represents an average farmer loyalty of 40%, which is lower than current actual farmer loyalty.
- In other words, Batian Nuts could consider sourcing from a smaller portfolio of farmers as it seems likely that they will be able to secure sufficient volumes at current actual loyalty rates.
- Batian Nuts plans to sell roasted macadamia nuts from 2022 onwards in the local market.

Peanut growth: farmers, volumes and processing capacity

Batian Nuts is strategically and gradually growing the size of its peanut portfolio

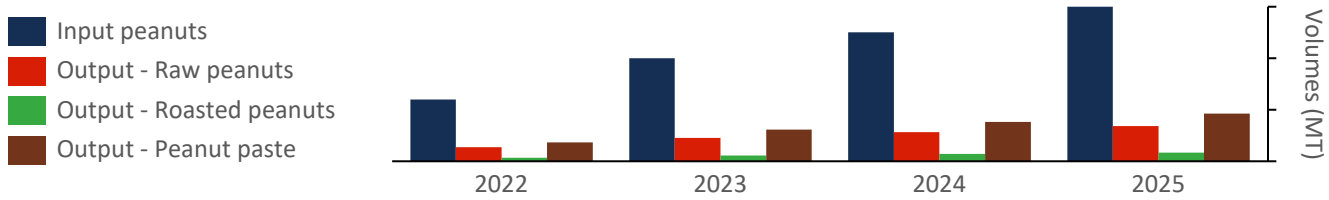
Peanuts volumes

Projections of farmers, volumes and processing capacity, from 2017 to 2025



Volume of processed peanuts

Volume of nut inputs and processed output per year (MT)



- In 2021, Batian Nuts, will start sourcing peanuts from the farmers it has onboarded onto its SDM and sell this to a competing processor in the local market. This is done as a service to provide access to a market for its farmers while the Batian Nuts factory is not yet ready.
- From 2022 onwards however, Batian Nuts will have completed their peanuts processing factory and be able to process the peanuts themselves.
- The peanuts processing factory will initially have a maximum processing capacity of [redacted] MT peanuts annually. Batian Nuts aims to reach full utilization of the peanuts processing factory by 2023.
- To accommodate for their scaling farmers and volume targets, Batian Nuts will expand the peanuts factory in 2024. This will allow for a sourced volume of [redacted] MT of peanuts, which is expected to be sourced from 6,350 farmers by 2025. This represents an average farmer loyalty of 65% based on the total marketable volumes expected to available from those farmers at the projected productivity increases.
- Batian Nuts is aiming to sell a range of processed peanut products from 2022 onwards: raw peanuts, roasted peanuts and peanut paste.

Business model

The current set-up of Batian Nuts' SDM is lean and strongly aligned to its core business model of sourcing and processing edible nuts

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

Core business

Access to market
- No fixed sourcing agreement between Batian Nuts and the farmers
- Mobile payment within 24 hours of delivery of produce
- Physical inspection to check for mold and insect damage is conducted upon delivery of produce at the buying center

Processing
- Batian Nuts currently processes macadamia nuts in their own processing factory
- Batian Nuts aims to build a processing factory for peanuts in 2022

Marketing
- Batian Nuts uses letters of intent to estimate sales volume to buyers in the export trade
- Buyer contracts are firmed up before closing the sale

Supporting activities

Buying center
- There are 28 buying center for macadamia and 12 for peanuts. Batian Nuts plans to increase the macadamia buying centers to 32 in 2021
- Farmers deliver their produce to the nearest buying center in their community
- Batian Nuts collects the produce at time of harvest in the buying centers

Weighing and quality check
- Batian Nuts weighs the produce and performs a visual quality check at delivery at the buying centers. Only macadamia produce that passes the quality checks is purchased
- Peanuts are subjected to an aflatoxin test which is conducted in an independent lab. Peanut farmers are paid once their nuts pass the aflatoxin test
- Buying centers are equipped with electronic weighing scales and the factory with electronic platform weighing scales

Service Delivery Model

GAP training
- BNL works closely with Govt. extension officers to offer farmer training
- Farmers are trained on Good Agricultural Practices (GAP) for growing and harvesting macadamia and peanut
- Peanut farmers are also trained on realizing aflatoxin-free peanuts

Farmer organization
- BNL has an established farmer base and is encouraging farmers to form farmer groups
- BNL encourages peanut farmer groups with an intention to include women and youth
- Women make up c.80% of Batian's farmer groups. Of these, c.50% are youth

Seedlings & seeds
- BNL has a nursery on which it grows and sells macadamia and other seedlings to farmers at a margin (c.15%)
- Scions for grafting of rootstock raised by BNL are sourced from farmers with high producing trees
- BNL collaborates with Egerton University for improved peanut seed varieties

Agrochemical inputs
- Currently BNL advises farmers on what high-quality inputs to purchase and from which local input providers

Agrochemical inputs*
- In the future BNL is considering to change the way it supports farmers on accessing inputs

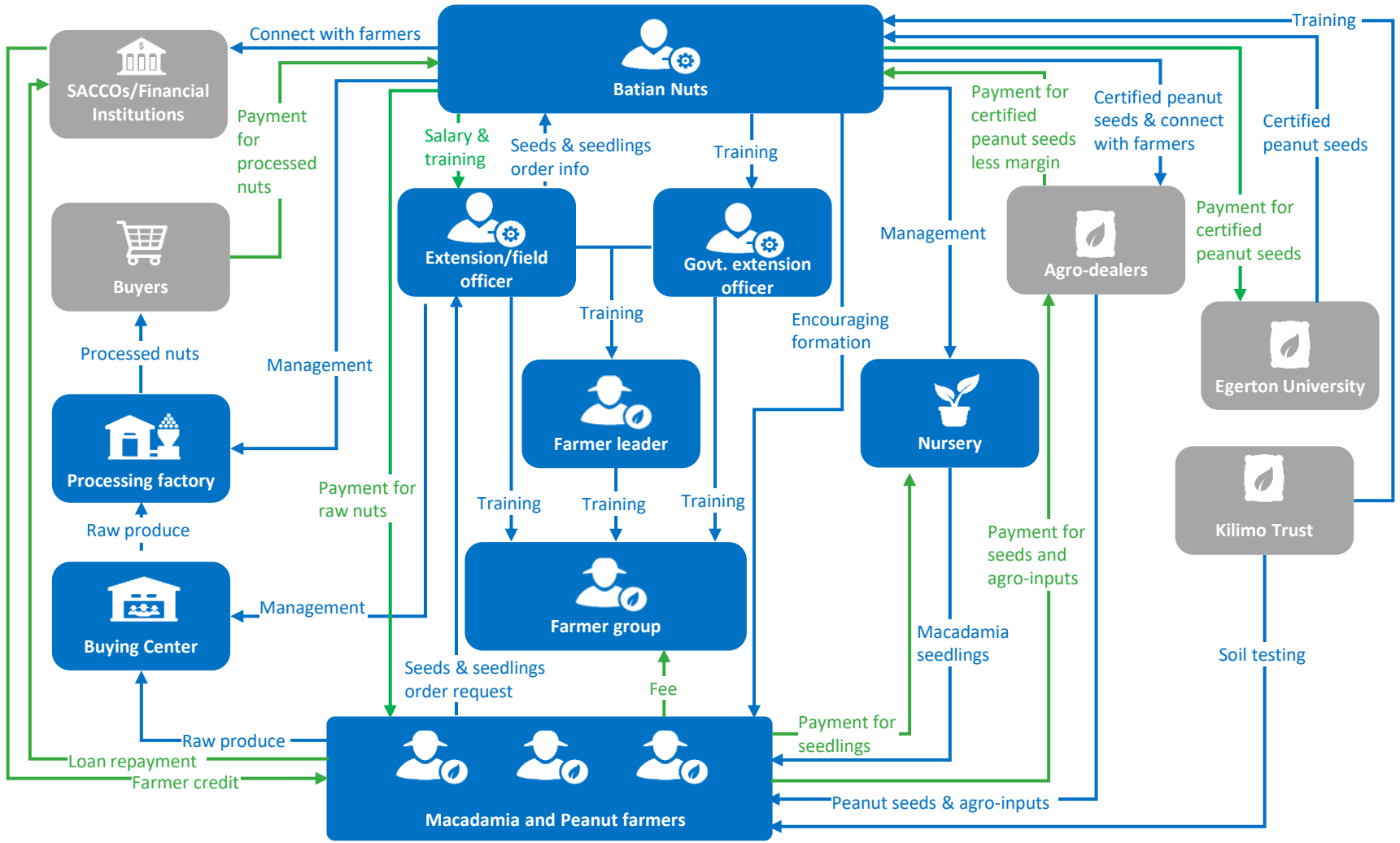
Access to finance*
- BNL actively seeks to identify FIs and SACCOs to finance farmers thus enabling them access inputs and services
- 45 peanut farmer groups have been linked with lenders. However, none has received credit yet as they are in the negotiation stage

Mechanization*
- BNL owns a thresher which is used, for free, by farmers for threshing peanuts in their farms
- BNL plans to produce and sell small de-husking and de-shelling machines to farmers from 2021 Prototype developments are ongoing
- BNL does not intend to earn profit from mechanization services

Margin

* Services considered for the future

Key channels



Service delivery channels

- Demo plots are used in training of peanut farmers. Each farmer group has at least one demo plot. Batian Nuts helps the farmers in setting up the demo plots by offering inputs.
- Batian Nuts has 50 macadamia farmer groups and 82 peanut farmer groups. All macadamia farmer groups and 25 of peanut farmer groups are legally registered.
- Currently Egerton University supplies Batian Nuts with certified peanut seeds. Batian Nuts pays the University (payment terms of 45 days) for the seeds once the agro-dealers, who sell the seeds to farmers, pay Batian Nuts. As of next year this set-up will change slightly, lowering the cost to the farmer and generating a small margin for Batian Nuts.
- Farmers collect seedlings from the nursey where they also receive GAP training in macadamia production.
- Batian Nuts plans to supply fertilizers, pesticides and handheld sprayers directly to farmers from 2021/2022. Field Officers, through the Buying Centers, would manage the distribution of these inputs and equipment.
- SACCOs offer cheaper credit (12%) in comparison to FIs (14%). However, farmers are required to register as SACCO members to enable them access credit.

Scope and scale

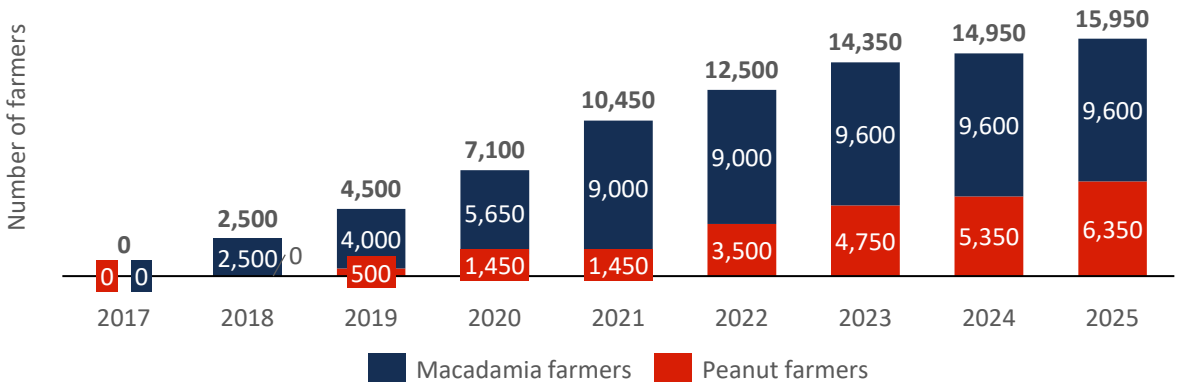
Farmers and Batian Nuts facilities are conveniently close to each other

About the outgrower model

- Batian Nuts currently sources macadamia nuts (since 2017) and peanuts (since 2019) from smallholder farmers in the larger Meru region, comprising of Meru and Tharaka Nithi Counties, Kenya
- The company intends to start sourcing cashew nuts from farmers in the same region
- Batian Nuts' macadamia processing factory and principal offices are in Nyagene village, Meru County
- The company intends to build a peanut processing facility in the same area
- This set up puts Batian Nuts in a position to maintain close relationships with the farmers, as farmers are situated within a 40 km radius of the processing facilities

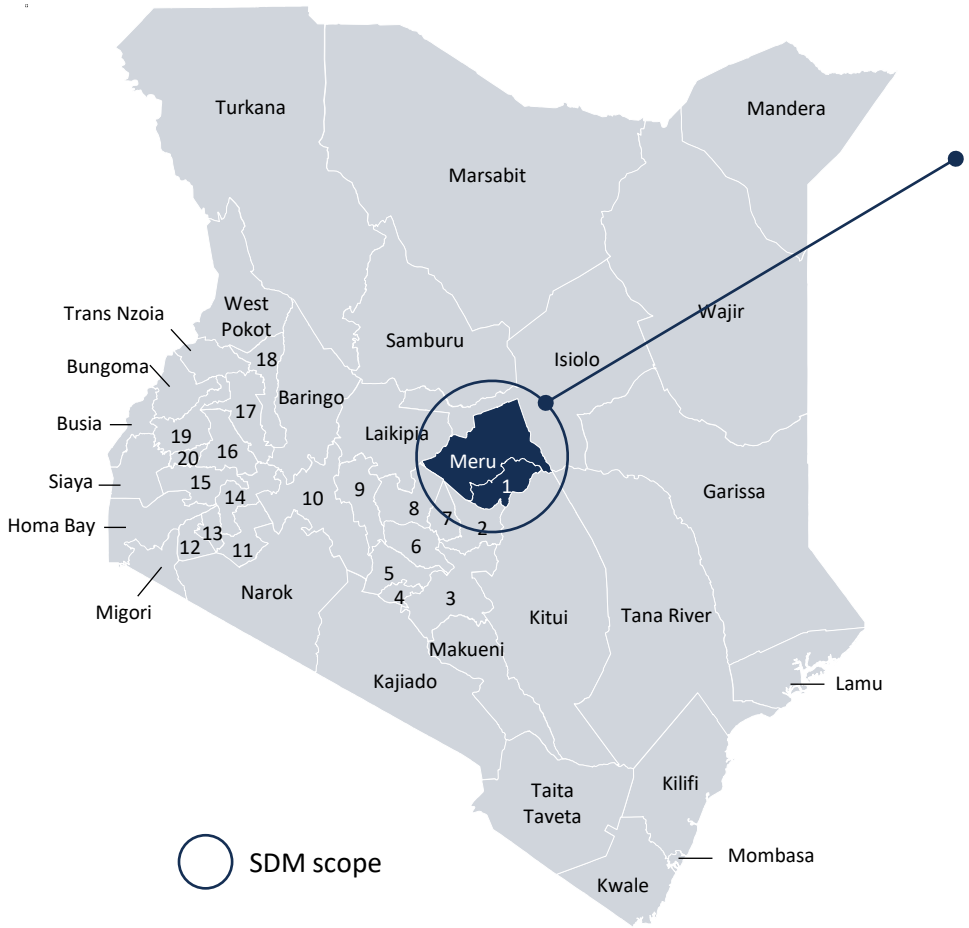
Scale of outgrower model

Number of farmers per year, per crop



Location of current and future outgrowers

Meru County, Kenya



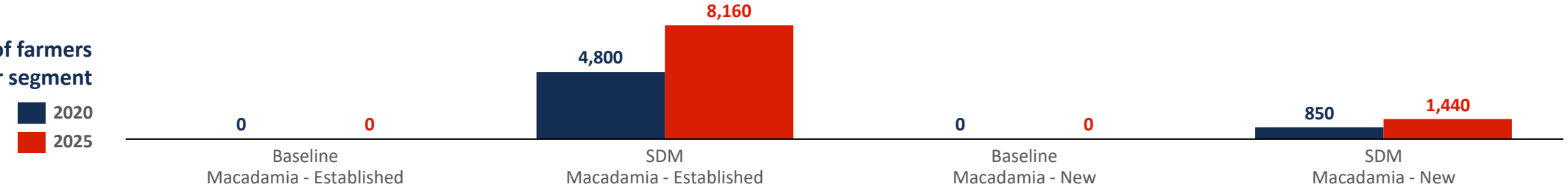
#	Area
1	Tharaka Nithi
2	Embu
3	Machakos
4	Nairobi
5	Kiambu
6	Murang'a
7	Kirinyaga
8	Nyeri
9	Nyandarusa
10	Nakuru
11	Bomet
12	Kisii
13	Nyamira
14	Kericho
15	Kisumu
16	Nandi
17	Uasin Gishu
18	Eigeyo Marakwet
19	Kakamega
20	Vihiga

Farmer segments - Macadamia

All macadamia farmers from which Batian Nuts sources are considered part of the Service Delivery Model

	Baseline Macadamia farmer	SDM Macadamia farmer	Baseline Macadamia farmer	SDM Macadamia farmer
	Established	*Established*	*New*	*New*
Description	A typical, experienced macadamia farmer in Meru County that does not supply to Batian Nuts	A typical, experienced macadamia farmer in Meru County that has (the intention of) a multi-year off-take relation with Batian Nuts	A new macadamia farmer in Meru County that does not supply to Batian Nuts	A new macadamia farmer in Meru County that has (the intention of) a multi-year off-take relation with Batian Nuts
Distinguishing characteristics	• Ungrafted, improved macadamia varieties for younger trees and ungrafted, traditional macadamia varieties for older trees • Very low input application	• Grafted, improved macadamia varieties for younger trees and ungrafted traditional varieties for older trees • Higher level of input application	• Ungrafted trees, improved macadamia varieties • Very low input application	• Grafted trees, improved macadamia varieties • Higher level of input application
Services	• Batian Nuts does not offer any services to these farmers	• GAP training • Farmer organization • Improved variety seedlings • Inputs • Off-take	• Batian Nuts does not offer any services to these farmers	• GAP training • Formal farmer organization • Improved variety seedlings • Inputs • Off-take

Number of farmers per segment

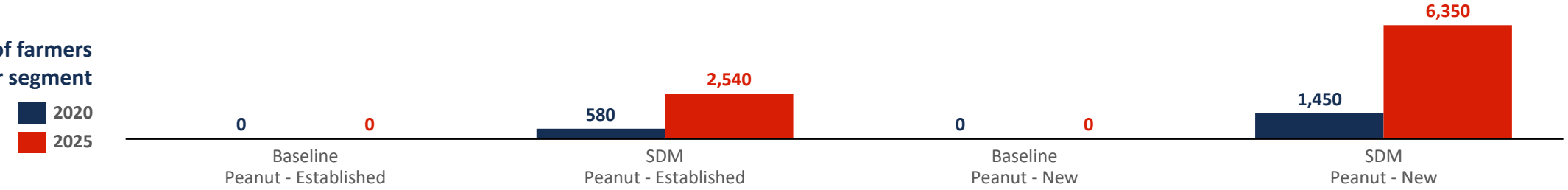


Farmer segments - Peanuts

All peanuts farmers from which Batian Nuts sources are considered part of the Service Delivery Model

	Baseline Peanuts farmer	SDM Peanuts farmer	Baseline Peanuts farmer	SDM Peanuts farmer
	Established	*Established*	*New*	*New*
Description	A typical, experienced peanut farmer in Meru County that does not supply to Batian Nuts	A typical, experienced farmer in Meru County that has (the intention of) a multi-year off-take relation with Batian Nuts	A new peanut farmer in Meru County that does not supply to Batian Nuts	A new peanut farmer in Meru County that has (the intention of) a multi-year off-take relation with Batian Nuts
Distinguishing characteristics	• Traditional peanut varieties • Very low input application • High levels of aflatoxin • High level of hired labor	• Improved peanut varieties • Higher level of input application • Lower levels of aflatoxin • High level of hired labor	• Traditional peanut varieties • Very low input application • High levels of aflatoxin • Limited hired labor	• Improved peanut varieties • Higher level of input application • Lower levels of aflatoxin • Limited hired labor
Services	• Batian Nuts does not offer any services to these farmers	• GAP training • Formal farmer organization • Aflatoxin-free seeds • Inputs • Off-take	• Batian Nuts does not offer any services to these farmers	• GAP training • Formal farmer organization • Aflatoxin-free seeds • Inputs • Off-take

Number of farmers per segment



Partners and stakeholders

Actor	Legal Status	Function (within this SDM)	Revenue model (within this SDM)	Incentive to participate (within this SDM)
Input providers	Private limited companies	• Sell crop protection and fertilizers to Batian Nuts farmers	• Margin on product sales	• Increased sales volumes
Egerton University	University in Kenya	• Researches new and higher yielding peanut varieties	• Margin from sale of seeds	• Bring into practice the results of research • Increased certified seeds sales volumes
Financial Institutions	Private limited companies	• Provides loans to Batian Nuts	• Payment of interest by Batian Nuts	• Increased sales volumes
2Scale	Incubator program for entrepreneurial producer organizations or local SMEs that trade or process the produce of farmers	• Provides Batian Nuts with technical and business support for setting and scaling up peanut production and processing	• None	• Batian Nuts Ltd is one of 2Scale's Business Champions through which it aims to achieve its impact goals
Government	Local, regional and national government	• Designs, implements and monitors compliance policy for the Kenyan agricultural market • Offering agricultural extension services	• None	• Sets the rules of the game of the Kenyan agricultural market • Better performance of the country's agricultural sector through farmer adoption of GAP

Partners and stakeholders

Actor	Legal Status	Function (within this SDM)	Revenue model (within this SDM)	Incentive to participate (within this SDM)
KALRO	Kenya Agricultural and Livestock Research Organisation (KALRO) is a government research institution under the Ministry of Agriculture, Livestock and Fisheries	• Executes and coordinates agricultural research in Kenya • Researches new and higher yielding macadamia seed varieties	• None	• Catalyzes the development of agricultural value chains in Kenya
SACCO & (M)FI	Private limited companies	• Provides input loans to Batian Nuts macadamia and peanut farmers	• Payment of interest by farmers • Loan processing fees	• Attract new agri-customers • Increased sales volumes
Soil Testing Partner	NGO in collaboration with private limited companies	• Conduct soil tests which inform the type of fertilizer recommended to farmers	• None	• Catalyzes the development of agricultural value chains in Kenya

SWOT Analysis

	Helpful	Harmful
Internal	**Strength** • Batian Nuts is physically close to famers and offers GAP training to farmers. They are therefore able to build personal relationships with farmers and increase loyalty • Strong and professional management team with lots of experience and knowledge about the market and working with smallholder farmers • Batian Nuts is known as a reliable off-taker that pays fairly and timely • Batian Nuts has as first mover advantage as they have introduced peanut farming using improved seeds in the region. As such the company is strategically positioned to overcome the challenges posed by the high prevalence of aflatoxin poisoning in the peanut sector • Batian Nuts has strategically designed a portfolio of (future) products with the potential to create financial resilience	**Weakness** • Batian Nuts does not have multi-year agreements with any of its off-takers, limiting its financing opportunities • Batian Nuts does not sign offtake agreements with farmers and has limited control on the application of GAP, and the timing and quantity of harvested produce delivered at BCs • Batian Nuts offers a number of critical services 'at arm's length', leading to limited control on purchase of improved variety seedlings and application of quality agro-inputs to ensure quality of harvested produce • The prevalence of aflatoxin poisoning in the peanut sector and the associated strict quality regulations hampers farmer investments in peanut farming • Under current assumptions the peanut processing business is not profitable by 2025
External	**Opportunities** • Macadamia is a high value crop yet requires less land and less labour compared to more traditional crops, making it attractive to farmers • Global demand for macadamia nuts is expected to continue growing • Pressure of pest and diseases on traditional crops creates an opportunity to grow macadamia • Provision of improved peanut varieties will attract farmers • Devolution of agriculture to the County Governments has brought extension services closer to the farmers • Embracing of technology in extension service provision results in wider spread application of GAP • Due to climate change, farmers are opting for crops such as peanuts which improve soil fertility • Changing eating patterns and recognition of its highly nutritious value has increased domestic demand for peanuts	**Threat** • High volatility in farm gate prices (due to volatility in demand) deters farmers from investing in their macadamia • Theft of macadamia seeds deters some farmers from continuing to grow macadamia • Illegal trade of unprocessed nuts to Asia leads to pre-mature harvesting and side-selling by farmers • Batian Nuts faces fierce competition in the market with 22 other established edible nuts processors in Kenya • Droughts occur more frequently and are less predictable, leading to lower yields • Covid-19 has dramatically disturbed the market for macadamia in 2020 and it remains unclear if and when the market will recover

SWOT

3. SDM PERFORMANCE

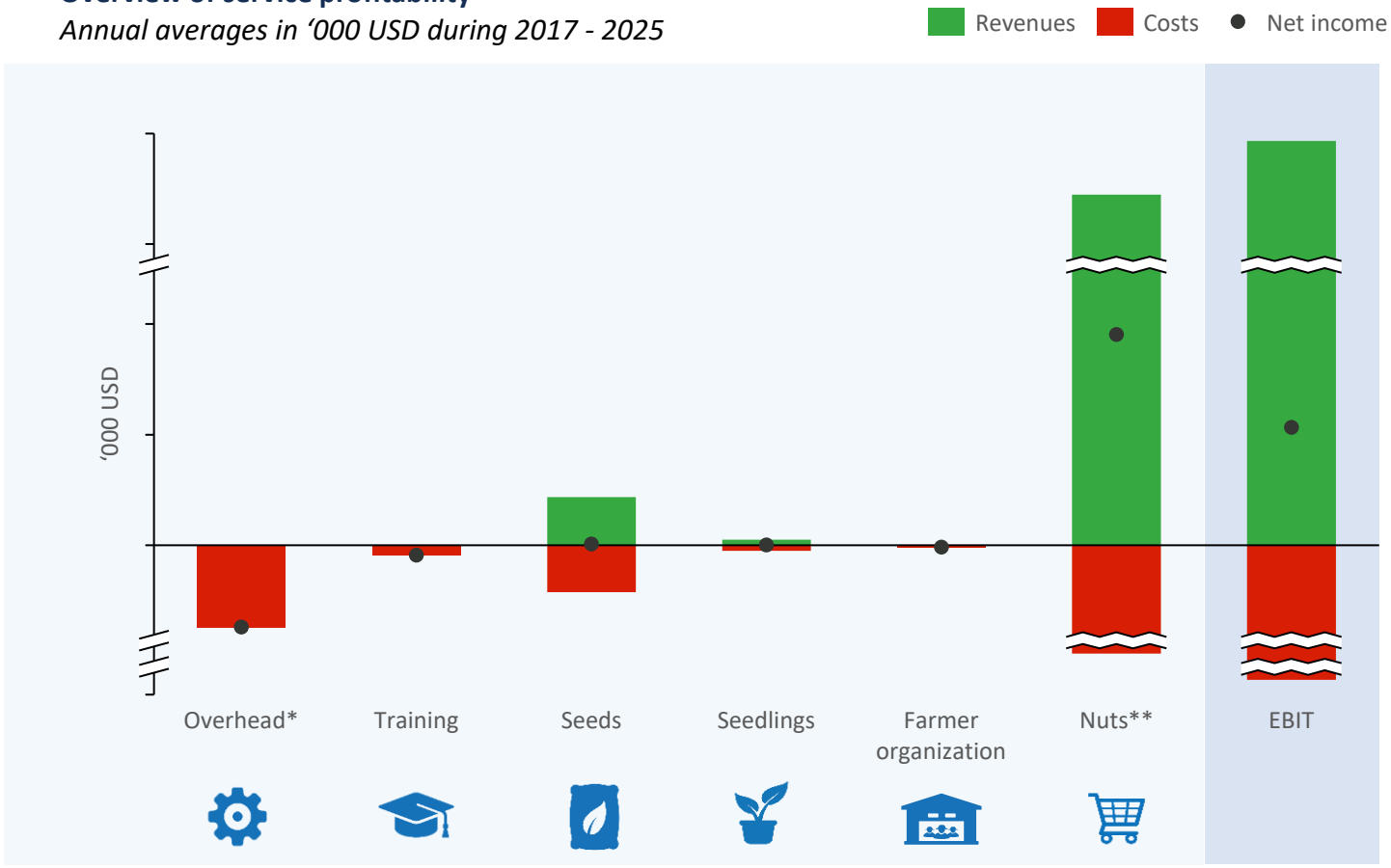
Assessing the SDM's financial performance and opportunities for improvement

Financial sustainability of Service Delivery Model

The costs for providing farmer training and farmer organization support are paid for by the commercial margins made on trading and processing of nuts

Overview of service profitability

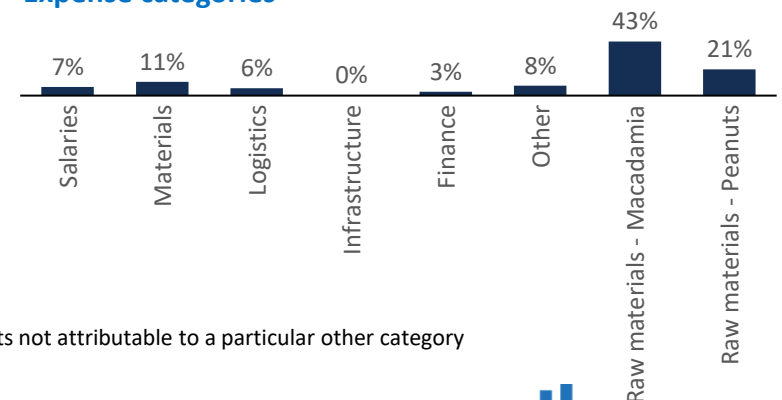
Annual averages in '000 USD during 2017 - 2025



Financial sustainability

- This SDM does not incur profits on most of the services provided: training, farmer organization and seedlings.
- The planned change to Batian Nuts' seed provision will allow them to earn a profit for this service from year 2021.
- Batian Nuts recoups the other costs through the additional commercial revenues from 1) increased sourcing per farmer, 2) increased number of farmers and 3) improved quality of nuts delivered to factories.
- The purchase cost of goods for macadamia and peanuts represent the two largest expenses, i.e. 43% and 21% respectively. Materials is the third key expense category due to the large equipment investments made in the buying centers.

Expense categories



* Largest costs included in Overhead category include costs for marketing & sales, finance costs & bank charges, motor vehicle running expenses and HR costs not attributable to a particular other category

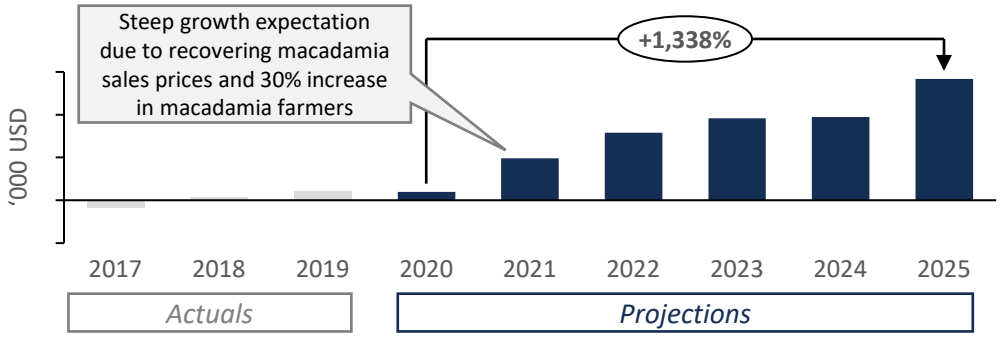
** Nuts includes the revenues and costs related to the sourcing, processing and sale of macadamia nuts and peanuts.

Financial sustainability of Batian Nuts and of nuts processing

Margins on macadamia processing compensate for a lack of margins on peanut processing, meaning actual growth is heavily dependent on the development of macadamia sales prices

EBIT over time

Net income in '000 USD, over time

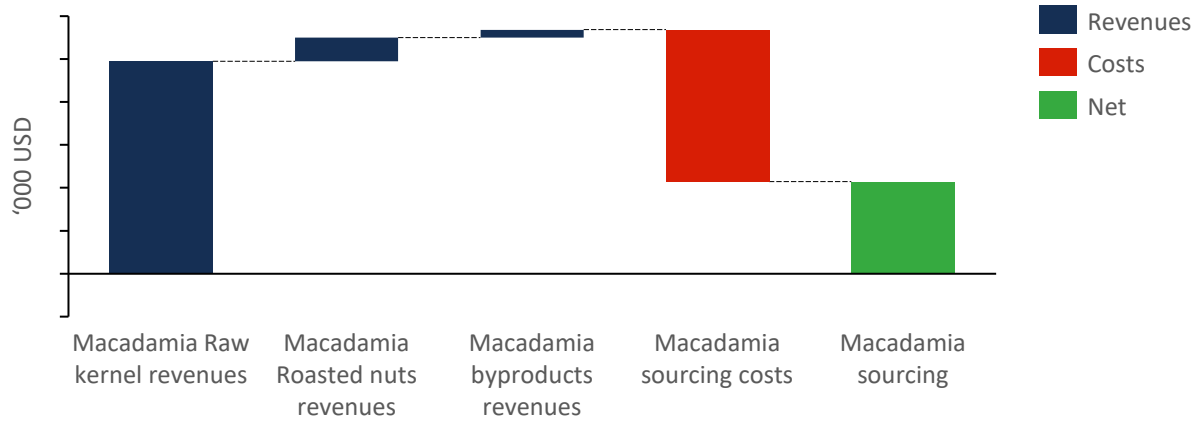


Financial sustainability

- Batian Nuts has been earning positive net profits since 2018 and is projected to grow to an annual profit of [redacted] million USD by 2025 based on Batian Nuts' current growth ambitions.
- A critical assumption to this projection is the development of the sales price for macadamia, which is modelled as non-volatile and recovering after the 2020 drop.
- The economic sustainability is driven by the increased productivity of macadamia. Ongoing investment in sourcing larger macadamia volumes and in the expansion of the macadamia processing factory in 2023 are expected to pay off.
- Batian Nuts' venture into peanut sourcing from 2021 onwards and subsequent investment in a peanut processing factory in 2022 is not expected to become profitable by 2025.

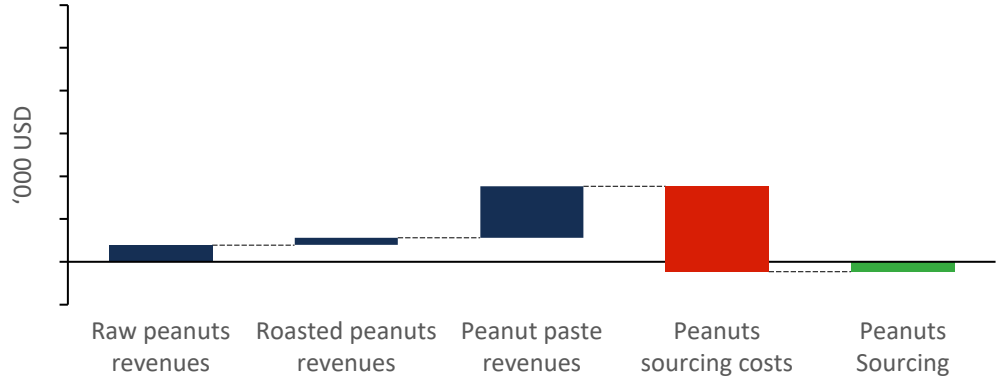
Macadamia processing* profit and loss

Profit and loss in '000 USD, annual average 2017-25



Peanut processing* profit and loss

Profit and loss in '000 USD, annual average 2021-25



* Costs categories included are raw materials, quality testing, processing, storage, transport, logistics, plant-, property- & equipment costs, salaries related to sourcing and processing

Nuts portfolio

In order to leverage the less volatile peanut portfolio to compensate for Batian Nuts' exposure to the volatility of the macadamia market, it needs to find a way to process peanuts at a profit

Macadamia pricing has a volatile nature. Below we explore what happens with Batian Nuts' net income in case macadamia prices go up versus down. We have off-set changes in prices against higher or lower farmer loyalty than currently assumed, of established macadamia farmers. This demonstrates the sensitivity of Batian Nuts' income against these two drivers, and with it the criticality of getting peanut processing profitable so that the income generated can protect Batian Nuts against shocks in the macadamia market.

Additionally it suggests that Batian Nuts can reduce the number of farmers it invests in and sources from: the loyalty rates currently modeled are lower than they are expected to be in reality*, which means that Batian Nuts can probably purchase sufficient volume of nuts from a smaller number of farmers and still operate at full processing capacity.

Impact of macadamia price:

At a price drop of around **10%** [redacted] Batian Nuts' net income and interest coverage ratio stay positive and healthy but drop by over **30%** [redacted], at equal farmer loyalty.

Change in net income and (ICR) in 2025 based on BNL's macadamia sales price and farmer loyalty**

('000 USD)

Established macadamia farmer loyalty (%)

Raw macadamia kernel sales price (USD/MT)

	34%	36%	38%	40%	42%	54%	46%
-14%	-65% (-60%)	-60% (-57%)	-56% (-53%)	-51% (-50%)	-46% (-46%)	-41% (-43%)	-36% (-39%)
-10%	-49% (-46%)	-44% (-42%)	-38% (-38%)	-33% (-34%)	-27% (-30%)	-21% (-26%)	-15% (-22%)
-5%	-32% (-30%)	-26% (-26%)	-20% (-22%)	-14% (-17%)	-7% (-13%)	0% (-9%)	7% (-4%)
0%	-14% (-14%)	-8% (-10%)	-1% (-5%)	0% (0%)	14% (5%)	22% (10%)	30% (15%)
+5%	3% (1%)	11% (6%)	19% (12%)	27% (17%)	35% (22%)	44% (28%)	53% (33%)
+10%	22% (18%)	30% (24%)	39% (29%)	48% (35%)	57% (41%)	67% (47%)	77% (53%)
+16%	63% (35%)	51% (41%)	60% (47%)	71% (54%)	81% (60%)	91% (66%)	102% (73%)

Current net income

Maximum factory processing capacity

Impact of farmer loyalty:

Keeping prices equal but looking at a scenario of **6%** increase in farmer loyalty (from 40% to 46%), drives income up by almost **30%** [redacted].

* Modeled loyalty rates are artificially low in order to avoid exceeding Batian Nuts' assumed processing capacity with volumes sourced from the assumed number of farmers and their productivity increase

** ICR = Interest coverage ratio: This value indicates Batian Nuts' ability to cover the interest expenses related to its debt with their earnings. Calculation Interest coverage ratio = EBIT/Finance costs

Sourcing efficiency

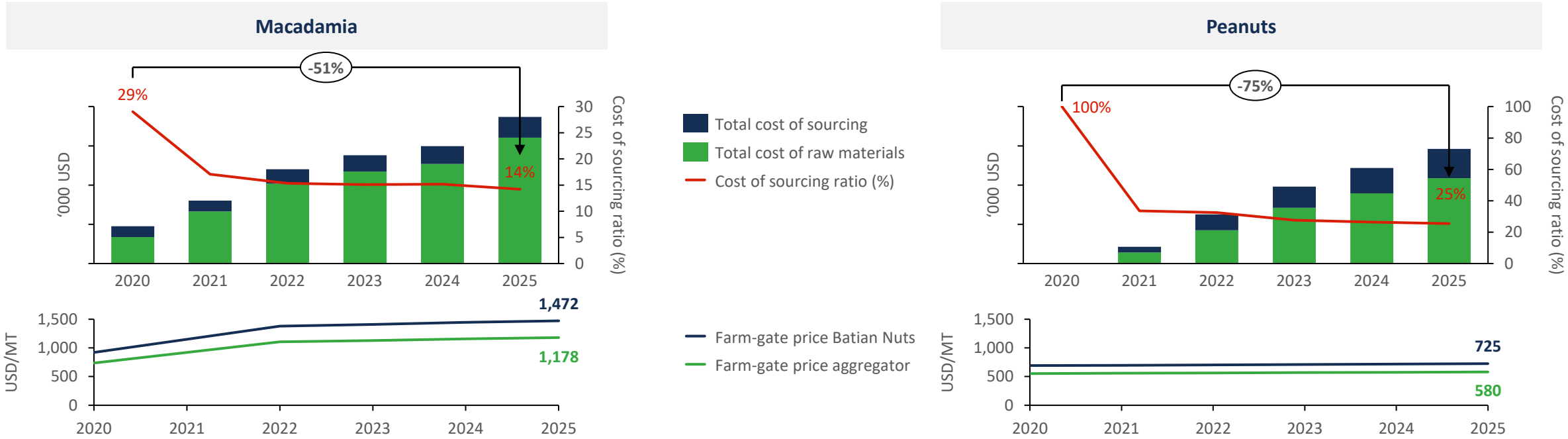
Batian Nuts direct sourcing strategy ultimately allows them to increase sourcing efficiency

Local aggregators play a double role in the value chain: they eat into the margins of processors and farmers in exchange for making sourcing from smallholder farmers less inefficient for processors. So on the one hand Batian Nuts needs more resources to manage the relationships with farmers as it sources directly from them. On the other hand, they can afford to pay a higher farm-gate price to farmers than local aggregators (on average 25% higher), which in turn helps them to increase farmer loyalty over time* and increases the efficiency of sourcing (sourcing cost / MT sourced) because higher volumes are sourced per farmer at the same sourcing cost.

This enables Batian Nuts to decrease their sourcing cost ratio for both macadamia and peanuts over time (from 29% to 14% for macadamia and 100% to 25% for peanuts respectively between 2020 and 2025), making it more cost-efficient to source one MT of macadamia or peanut over time, while maintaining a direct relationship with the farmers.

Overview of costs of sourcing for macadamia and peanuts

Annual total operational cost in '000 USD, total purchase cost in '000 USD, operational cost of sourcing in USD/MT, farm-fate price in USD/MT and operational sourcing cost ratio (%)



* Modeled loyalty rates are artificially low in order to avoid exceeding Batian Nuts' assumed processing capacity with volumes sourced from the assumed number of farmers and their productivity increase

Back to Recommendations

Drivers for income growth of Batian Nuts

Increasing the loyalty rates* for established macadamia farmers provides the most effective route to +USD 1.0M pre-tax net income

		Income driver	Unit	Modeled assumption	Required assumption for +USD 1M net income	Change required
Macadamia portfolio	Revenue drivers	Sales price – Raw macadamia	*USD/MT*	[redacted]	[redacted]	**18%**
		Sales price – Roasted macadamia	*USD/MT*	[redacted]	[redacted]	**133%**
		Loyalty of Macadamia farmers - Established	*%*	40	57	**43%**
	Cost drivers	Farm-gate price high-quality macadamia	*USD/MT*	1,472	1,013	**-31%**
Peanut portfolio	Revenue drivers	Sales price – Raw peanuts	*USD/MT*	[redacted]	[redacted]	**194%**
		Sales price – Roasted peanuts	*USD/MT*	[redacted]	[redacted]	**388%**
		Sales price – Peanut paste	*USD/MT*	[redacted]	[redacted]	**53%**
		Loyalty of Peanuts farmers	*%*	65	[Max income: [redacted]]	**[+100%]**
	Cost drivers	Farm-gate price high-quality peanuts	*USD/MT*	725	392	**-46%**

- Year 2025 pre-tax net income is **USD** [redacted] in the base case. The table shows **what change to each key variable would yield a +USD 1.0M pre-tax net income gain** over the same period.
- Of the income revenue drivers over which Batian Nuts has influence, loyalty rates of macadamia farmers stand out as the most influential driver, as the lowest relative change (43%) is required to increase net income. It is important to note that actual loyalty rates are expected to by significantly higher than the modeled loyalty rates. Further increases will necessarily lead to a reduction in farmers sourced from (assuming that modeled productivity increase and processing capacity are realized).
- Sales and farm-gate prices are drivers that can further improve income towards the increase of USD 1M in net income with relative minor changes (18% and 53% for the sales prices respectively, and 31% and 46% for the FGP respectively). However, Batian Nuts has limited control over these prices.

* Modeled loyalty rates are artificially low in order to avoid exceeding Batian Nuts' assumed processing capacity with volumes sourced from the assumed number of farmers and their productivity increase

Farmer Group incentives

A cost/benefit analysis of providing Farmer Groups with a financial reward for meeting volumes and quality shows that Batian Nuts could consider it if the increase in farmer loyalty is expected to justify it

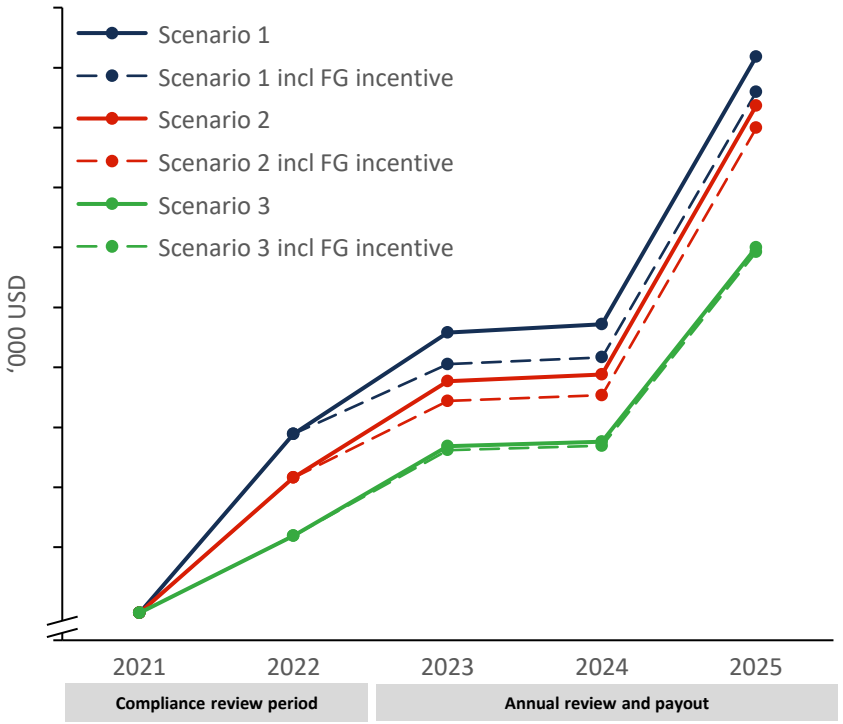
When exploring the impact of an incentive mechanism at farmer group level on Batian Nuts' net income, we assumed the rewards and penalties listed in the below overview (to be considered indicative, not prescriptive). We then assumed three scenario's in which we adjusted the share of Farmer Groups that was able to deliver volumes to Batian Nuts in compliance with the contract specifications: 100% of farmer groups compliant, versus 70% or only 30%.

The line graph then shows the net income of Batian Nuts and how it is affected by (1) a higher versus lower share of compliant Farmer Groups and (2) the costs of paying out the rewards (minus penalties) for contract compliance to farmer groups. From the graph we can carefully conclude that the cost of the modelled rewards and penalties serve their purpose: Batian Nuts' net income after paying farmer group rewards for contract compliance is not only higher than the net income for scenario 2 in which no rewards are paid, but also higher than the other modelled scenarios.

Three scenarios of Batian Nuts' net income over time, applying a fixed reward for contract compliance

Over time, in USD/year

Loyalty rate Macadamia	30% -> 40%		
Loyalty rate Peanuts	40% -> 65%		
Annual Macadamia FG reward	400 USD		
Annual Peanuts FG reward	100 USD		
Annual Macadamia FG penalty	100 USD		
Annual Peanuts FG penalty	25 USD		
Share of FGs compliant	100%	70%	30%
	Scenario 1	**Scenario 2**	**Scenario 3**



Agrochemical inputs on credit

Batian Nuts considers offering high-quality agrochemical inputs to farmers on credit, which would further impact the livelihoods of the farmers, as well as increase security of supply for Batian Nuts.

With Batian Nuts providing the inputs on credit the SDM farmers are not only able to access finance at a slightly lower cost but are also able to repay the inputs at times when cashflow constraints are lowest – at sales of the harvested produce.

	Current model 1 **AT ARM'S LENGTH**	2 **SHARED RISK & RETURNS**	3 **BUY/SELL MODEL**
	Batian Nuts recommends trustworthy supplier(s) of high-quality inputs to farmers.	*Batian Nuts sets up legal entity with trustworthy supplier(s) of high-quality inputs and risks and returns of sales to farmers are shared equally.*	*Batian Nuts buys high-quality inputs from trustworthy supplier(s) in bulk and sells to farmers at a small margin.*
+	No risk or cost to Batian Nuts as supplier takes the risk of the farmer debt. A small goodwill can be charged to supplier for providing access to farmers.	Allows for partners to align incentives, share risk of farmer defaults and reap returns of increased sales of high-quality inputs.	Batian Nuts has full control and can be flexible in how to set up the service in detail. A small margin will be earned on repaid inputs.
−	Limited control and therefore potentially limited benefit to Batian Nuts as incentives are not 100% aligned with supplier.	More complex set-up requiring more human and financial resources (trade finance for advance purchase of inputs vs selling of nuts)	Batian Nuts takes the full risk of farmer defaults, but also bears the cost of (unsold) inventory. Buying in bulk to lower cost reduces customization options. Significant additional trade finance is required.

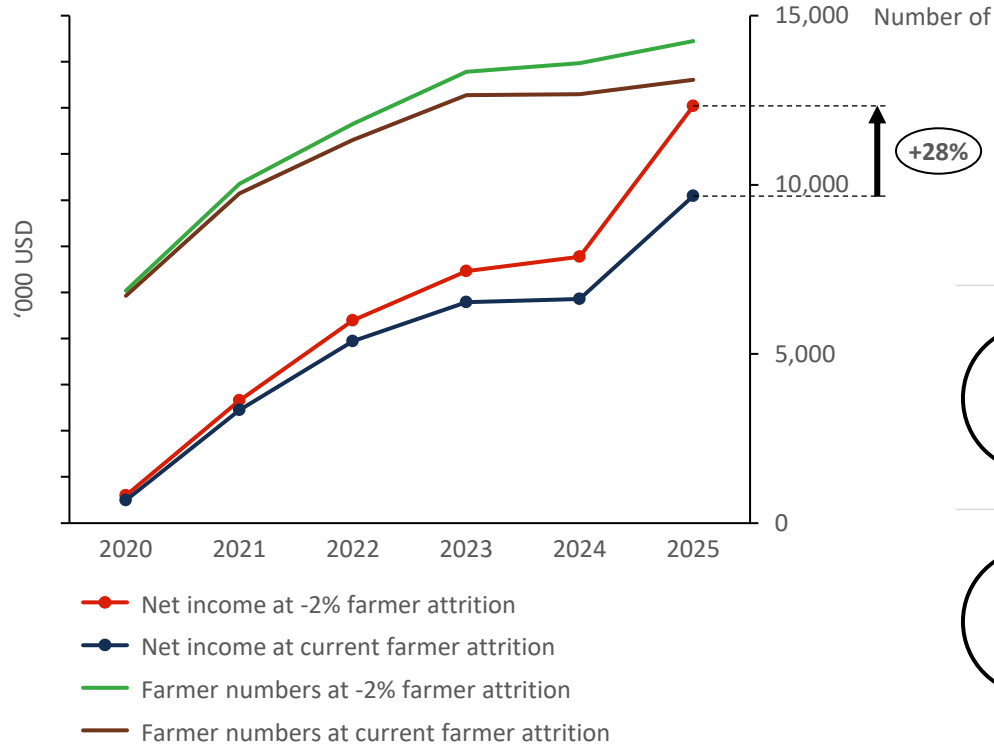
Crop insurance – Batian Nuts

Batian Nuts can consider using the expected increase in net income from higher retention due to crop insurance, to invest in the offering of crop insurance

The graph below shows the positive impact on Batian Nuts' net income of a 2% lower attrition rate than currently assumed (5% for macadamia farmers and 2% for peanut farmers). This lower turn-over of farmers is considered a consequence of offering crop insurance to farmers as farmers will be more resilient in years of bad crops and therefore less inclined to move away from participating in the Batian Nuts Service Delivery Model. Next to the graph we explain in general terms what the (dis)advantages are expected to be for two different ways of investing the surplus income.

Comparing SDM net incomes with current and higher retention rates

Over time, in USD/year



	1 PARTNERSHIP	2 SUBSIDY
	Batian Nuts partners with an insurance provider, pays the insurance premium on behalf of the farmer and deducts the premium from the price paid for nuts.	*Batian Nuts subsidizes the insurance premium by paying part of the insurance premium to the insurance provider on behalf of the farmer.*
+	No need to subsidize the insurance premium, and relatively easy to implement with high certainty of farmers being covered by insurance.	Batian Nuts does not run the risk of farmers not repaying the insurance premium in the form of produce. No additional resources are required for administration and debt chasing.
−	Batian Nuts runs all the risk in case farmers side-sell and/or do not provide sufficient produce to Batian Nuts to cover the cost of the insurance premium paid on their behalf by Batian Nuts. Additional resources are required.	This model creates additional cost to Batian Nuts. If the cost is to be kept within the range of expected income increase, the subsidy could increase from a max of 3 USD/farmer in 2021 to 27 USD/farmer by 2025.

4. FARMER PERFOMANCE

Assessing farmer impact and opportunities for improvement

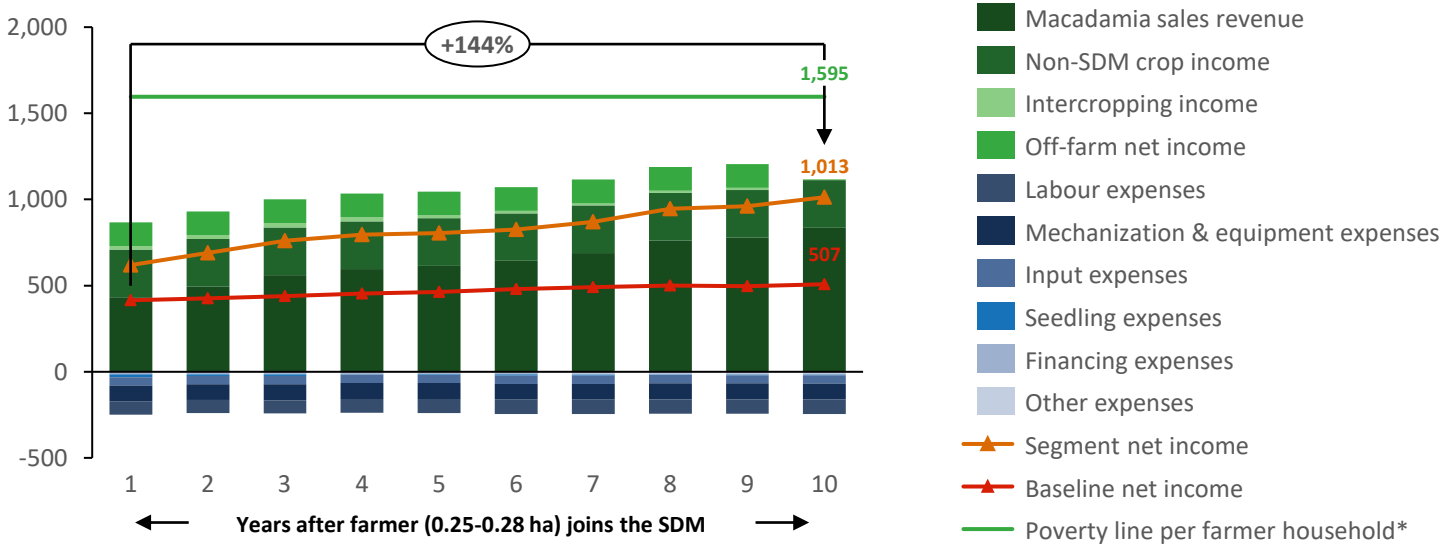
Macadamia farmer net income – over time

Replacement of macadamia trees with high-quality seedlings is key to maintain sustainable levels of revenue

Comparing the 10-year development of net income of a Baseline and SDM farmer for both an Established or a New macadamia farmer shows an enormous positive impact from participating in Batian Nuts' SDM. This is explained by the fact that farmers working with Batian Nuts have access to high-quality grafted seedlings, which not only have higher yields but also flower four years earlier than the local seedlings used by baseline farmers. For an established SDM farmer this is demonstrated by the stark increase in macadamia sales revenues over time as the farmer gradually replaces its old macadamia trees with grafted improved varieties of seedlings, while the baseline farmer uses local seedlings. The below graph for a new SDM farmer shows higher seedling expenses and no macadamia sales revenues during the first 4 years while the macadamia farm is set up, with main revenues stemming from intercropping and off-farm income. Once the macadamia trees flower, the macadamia sales revenues will become the main revenue source and new farmers will reach a higher expected income than established SDM farmers. Likewise, when comparing the new SDM farmer with a baseline farmer, the early flowering of the macadamia trees allows them to reach higher net incomes from year 5 onwards.

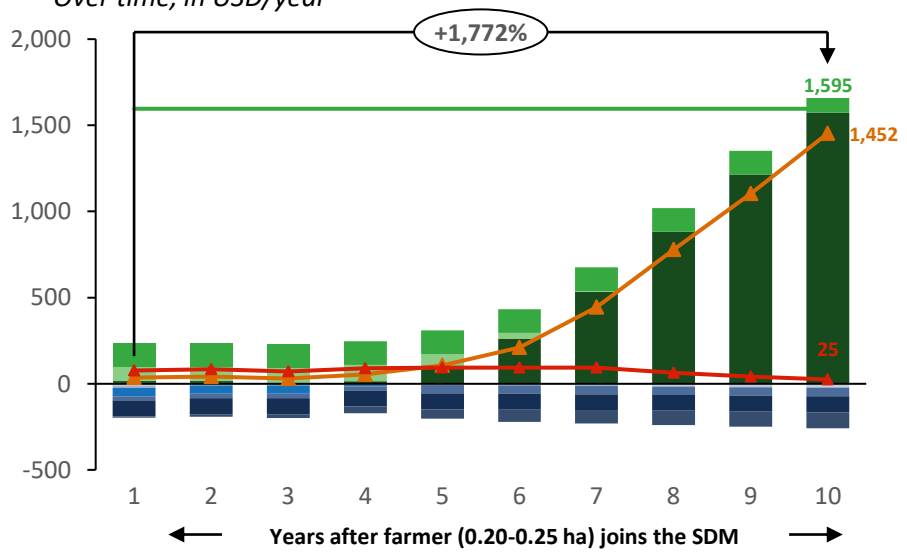
Comparing net incomes of established baseline and SDM farmers

Over time, in USD/year



Comparing net incomes of new baseline and SDM farmers

Over time, in USD/year



Note: This farmer P&L is projected over ten years as Macadamia is a tree crop and the impact of replantation or rejuvenation is only demonstrated after several years.

* Source: World Bank (2016), Online PPP database, private consumption. The poverty line adjusted for purchasing power is estimated at USD 319/individual/year in Kenya. For a farmer household consisting of 5 members (average HH size based on PDC collected), this equates to USD 1,595 per household annually.

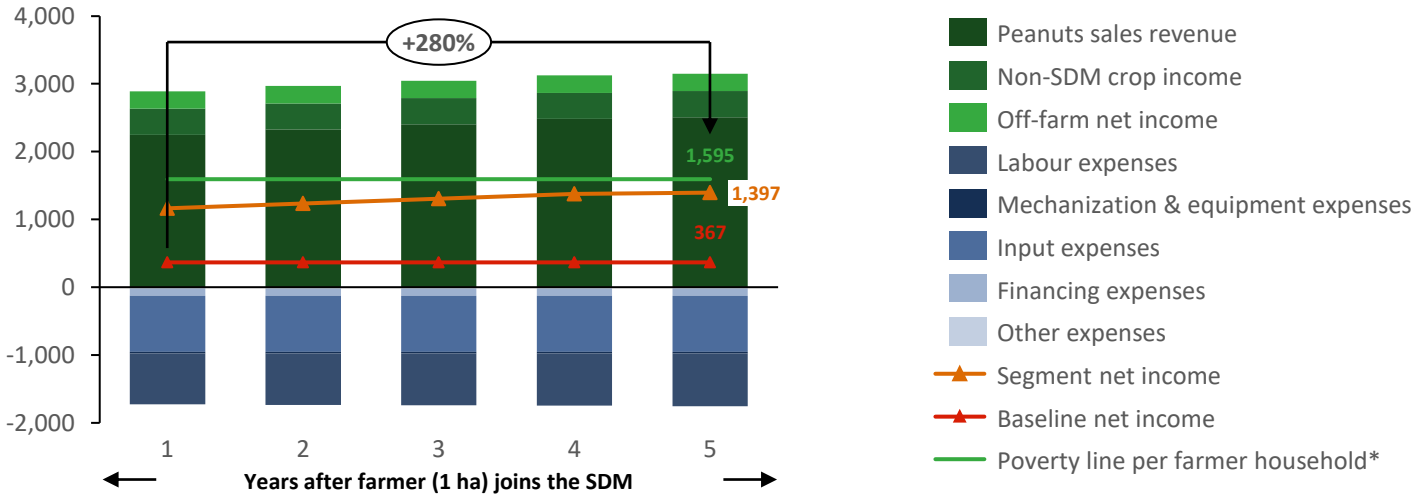
Peanut farmer net income – over time

Access to quality seeds for peanut farmers leads to large growth in income, although new peanuts farmer are expected to have higher initial net income due to lower costs compared to established farmers

Comparing the 5-year development of net income of a Baseline and SDM farmer for both an Established or a New peanut farmer shows an enormous positive impact from participating in Batian Nuts' SDM (280% and 171% respectively). The increase for an established SDM farmer is larger than the increase for a new SDM farmer when comparing to their respective baselines, since the new farmer baseline typically is an existing farmer that grows other crops and makes the switch to peanuts. The remainder of the positive increase in net income over all 5 years is explained by the access of SDM farmers to high-quality, aflatoxin-free peanut seeds and other services such as GAP training and good agrochemical inputs. When comparing the net income of an established SDM farmer with a new SDM farmer, it appears the business case for new peanut farmers is more positive than for established farmers. This is due to 1) lower levels of hired labour by a new farmer as this farmer is assumed to have less financial room to hire labour compared to an established farmer, and 2) the lower quantity of fertilizer used by a new farmer as it is assumed that the soil quality is better due to changing to a different crop as opposed to an established farmer who has been growing the same crop for several years.

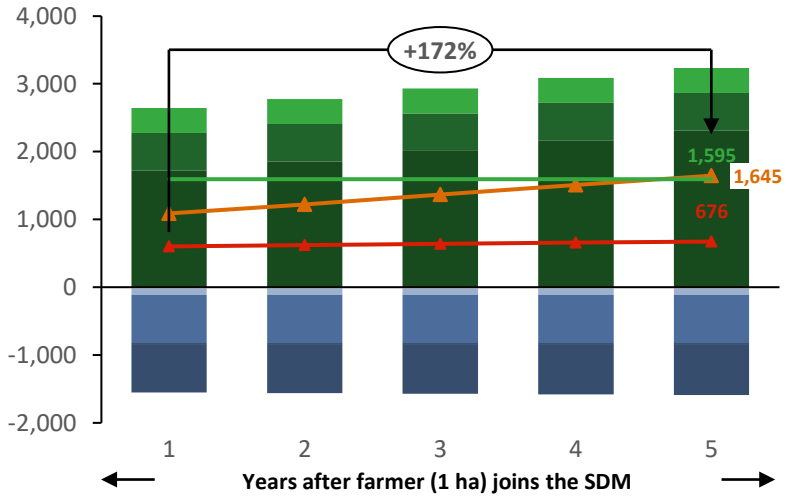
Comparing net incomes of established baseline and SDM farmers

Over time, in USD/year



Comparing net incomes of new baseline and SDM farmers

Over time, in USD/year



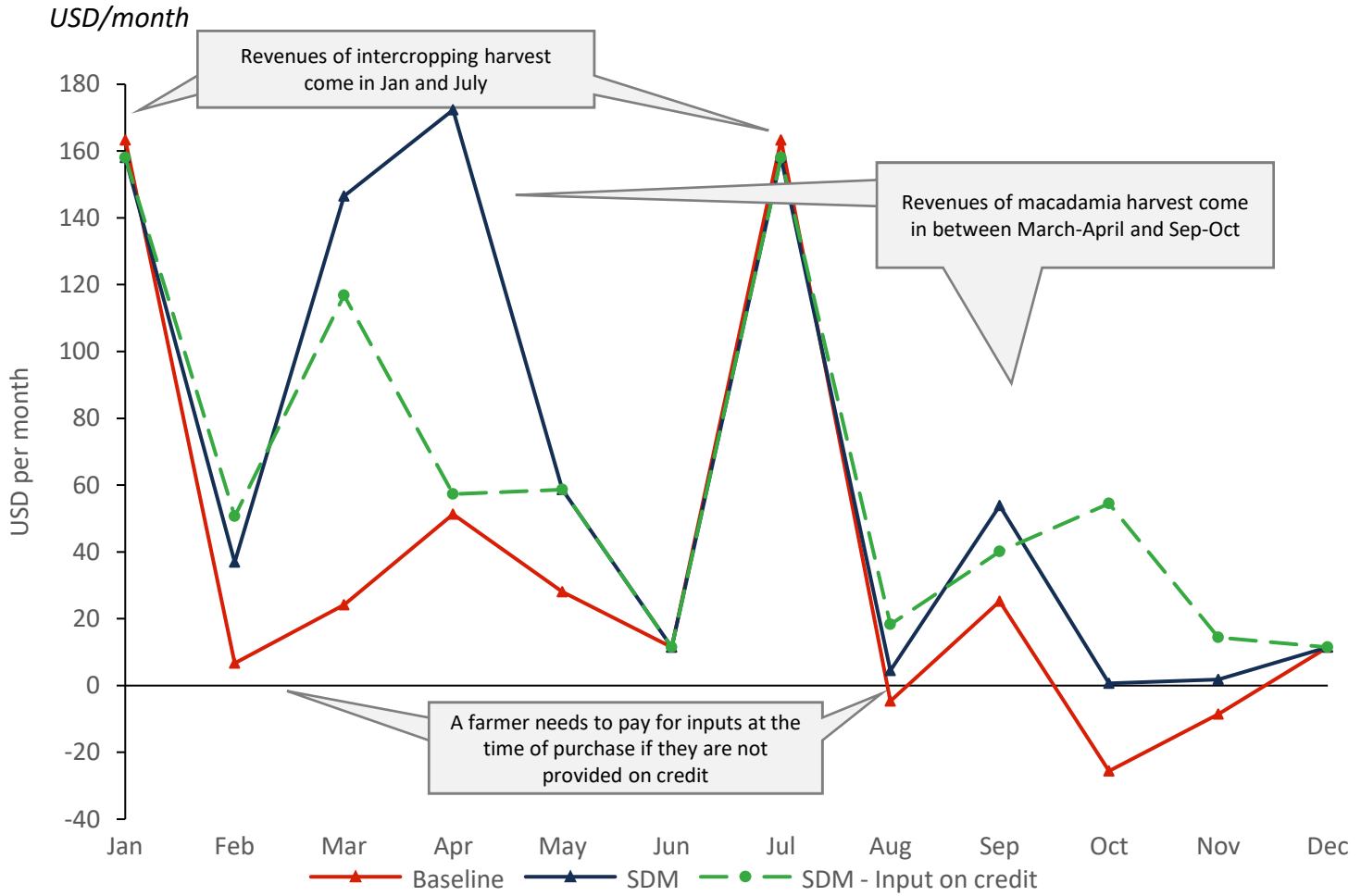
Note: By default we project a farmer P&L of annual crops over five years.

* Source: World Bank (2016), Online PPP database, private consumption. The poverty line adjusted for purchasing power is estimated at USD 319/individual/year in Kenya. For a farmer household consisting of 5 members (average HH size based on PDC collected), this equates to USD 1,595 per household annually.

Established Macadamia farmer cash-flow

Batian Nuts gives farmers access to both high quality inputs and higher revenues resulting in a positive cashflow

Comparing average cash flows over 5 years of Baseline and SDM farmers



High sales revenues clearly balance out costs

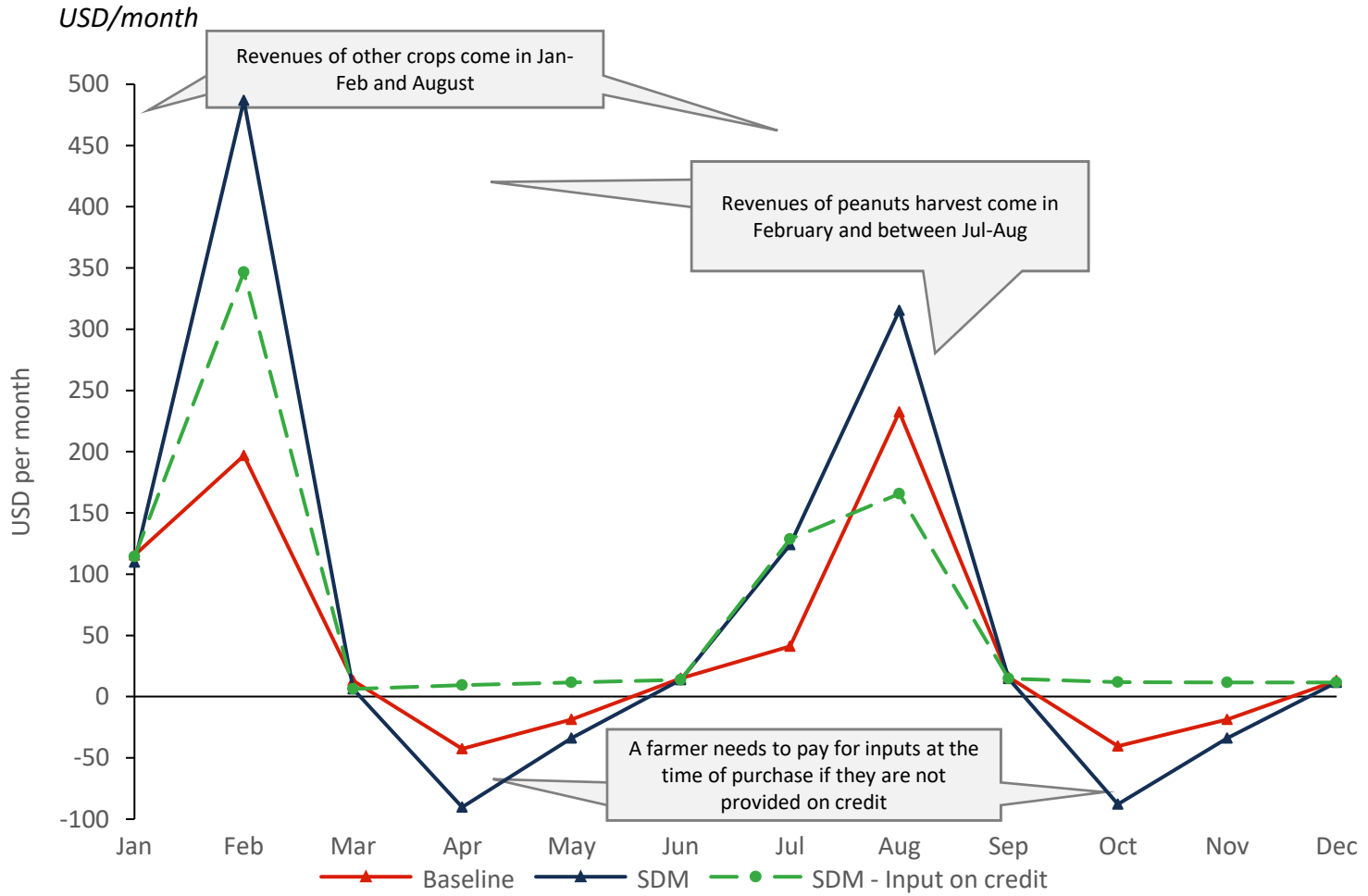
- Cashflow for macadamia farmers is quite volatile as the revenues from sales of macadamia coincide with the timing of purchasing inputs for the next season and the cost of main labor activities, while the revenues from other crops come in the months in between.
- The cashflow for SDM farmers is improved compared to the one of baseline farmers because of the higher revenues from macadamia sales. This allows the SDM farmers to use these sales revenues to cover the labor costs and input costs for the next season. This in spite of the fact that the inputs that SDM farmers use are more costly.
- The hypothetical cashflow for SDM farmers who pay for the same inputs upon sales of their macadamia harvest (input on credit) shows a slightly more stable picture, as the inputs are paid not when his net income is lowest but when it is highest (in April and September).

[1] Note: we were not able to obtain cash-flow assumptions from interviews with farmers, so these numbers potentially exclude some significant annual expenses, like school fees. They also do not account for unexpected off-farm expenses like medical costs, weddings, funerals etc. The assumptions were obtained from BNL field staff who are expected to have a good understanding of farmer cash-flows, and stress-tested against literature where available.

Established Peanuts farmer cash-flow

The cashflow of Batian Nuts' farmers is more volatile but with a positive trend

Comparing average cash flows over 5 years of Baseline and SDM farmers



Volatile but positive cashflow

- The cashflow for SDM farmers is more volatile than for baseline farmers due to the higher expected revenues from sales of peanuts, higher post-harvest labor costs and the higher cost associated with applying more quantities of higher quality inputs.
- The hypothetical cashflow for SDM farmers who pay for the same inputs upon sales of their peanuts harvest (input on credit) have a much more stable cashflow, as the inputs are paid not when his net income is lowest but when it is highest (in February and August).

[1] Note: we were not able to obtain cash-flow assumptions from interviews with farmers, so these numbers potentially exclude some significant annual expenses, like school fees. They also do not account for unexpected off-farm expenses like medical costs, weddings, funerals etc. The assumptions were obtained from BNL field staff who are expected to have a good understanding of farmer cash-flows, and stress-tested against literature where available.

Drivers for income growth of macadamia farmers

Increasing total macadamia production even further would provide the quickest route to reach an income equal the poverty line

		Income driver	Unit	Modeled assumption	Required assumption for poverty line income*	Change required
Established Macadamia farmer	Revenue drivers	Total production	*Kg*	[redacted]	[redacted]	**71%**
		FG price high-quality macadamia	*USD/MT*	920	2,384	**159%**
		Post-harvest loss	*%*	10	[Max income: 1,105]	**[-100%]**
	Cost drivers	Labor costs	*USD/year*	9,300	[Max income: 1,098]	**[-100%]**
		Input costs	*USD/year*	48	[Max income: 1,067]	**[-100%]**
		Seedling costs	*USD/seedling*	3.22	[Max income: 1,017]	**[-100%]**
New Macadamia farmer	Revenue drivers	Total production	*Kg*	[redacted]	[redacted]	**9%**
		FG price high-quality macadamia	*USD/MT*	920	1,055	**15%**
		Post-harvest loss	*%*	19	11	**-42%**
	Cost drivers	Labor costs	*USD/year*	93	[Max income: 1,543]	**[-100%]**
		Input costs	*USD/year*	48	[Max income: 1,504]	**[-100%]**
		Seedling costs	*USD/seedling*	3.22	[Max income: 1,452]	**[-100%]**

- Year 10 pre-tax net income for a SDM Established and New macadamia farmer is modeled to be USD 1,013/year and USD 1,452/year. The table shows **what change to each key income driver would yield a net income equal to the poverty line*** (USD 1,595/year) over the same period.
- Of the income revenue drivers over which Batian Nuts has influence, macadamia production stands out as the most influential driver, as the lowest required relative change (71% and 9%) to allow farmers to reach poverty income levels.
- Additionally, post-harvest loss and the farm-gate price paid to New macadamia farmers are drivers that can further improve income towards the poverty line with relative minor changes (15% and 42% respectively).
- It is important to note that even though the farm-gate price is a farmer income driver, Batian Nuts must simultaneously ensure to safeguard their margin for sustainability of the business.

*Poverty line per household was used as benchmark instead of Living income per household for Kenya of 7,054 USD/year, as the change required to reach living income was considered too high and thus less indicative for a sensitivity analysis.

Drivers for income growth of peanut farmers

Increasing productivity even further would provide the quickest route to reach an income equal the poverty line

		Income driver	Unit	Modeled assumption	Required assumption for poverty line income*	Change required
Established Peanut famer	Revenue drivers	Seasonal productivity	*Kg/ha/season*	[redacted]	[redacted]**	**92%**
		FG price high-quality peanuts	*USD/MT*	782	1,603	**105%**
		Land size (peanuts only)	*Ha*	0.35	1.06	**203%**
		Aflatoxin loss	*%*	10	[Max income: 1,063]	**[-100%]**
	Cost drivers	Labor costs	*USD/year*	286	[Max income: 1,218]	**[-100%]**
		Input costs	*USD/year*	290	[Max income: 1,259]	**[-100%]**
		Seed costs	*USD/kg*	2	[Max income: 1,096]	**[-100%]**
New Peanut farmer	Revenue drivers	Seasonal productivity	*Kg/ha/season*	[redacted]	[redacted]**	**142%**
		FG price high-quality peanuts	*USD/MT*	782	2,057	**163%**
		Land size (peanuts only)	*Ha*	0.20	0.80	**300%**
		Aflatoxin loss	*%*	10	[Max income: 1,116]	**[-100%]**
	Cost drivers	Labor costs	*USD/year*	154	[Max income: 1,216]	**[-100%]**
		Input costs	*USD/year*	143	[Max income: 1,223]	**[-100%]**
		Seed costs	*USD/kg*	2	[Max income: 1,140]	**[-100%]**

* Poverty line per household was used as benchmark instead of Living income per household for Kenya of 7,054 USD/year, as the change required to reach living income was considered too high to less indicative for a sensitivity analysis.

** Obtainable yield is 2,500 kg/ha/season and Optimal yield is 3,500 kg/ha/season.

- Year 5 pre-tax net income for a Segment Established and New peanut farmer is modeled to be USD 932/year and USD 1,062/year. The table shows **what change to each key income driver would yield a net income equal to the poverty line*** (USD 1,595/year) over the same period.
- Of the income revenue drivers over which Batian Nuts has influence, productivity stands out as the most influential driver, as the lowest required relative change (92% and 142%) to allow farmers to reach poverty income levels.
- However, it is key to note that there is limit to productivity increase which can be achieved by the services and in the specific farming context. Therefore, Batian Nuts could consider offering other support that focuses on additional income generation through diversification or increase of land size.
- The farm-gate price is also a driver which can further improve income towards the poverty line, but this is to an important degree dictated by the going sales price.

Crop insurance – farmer

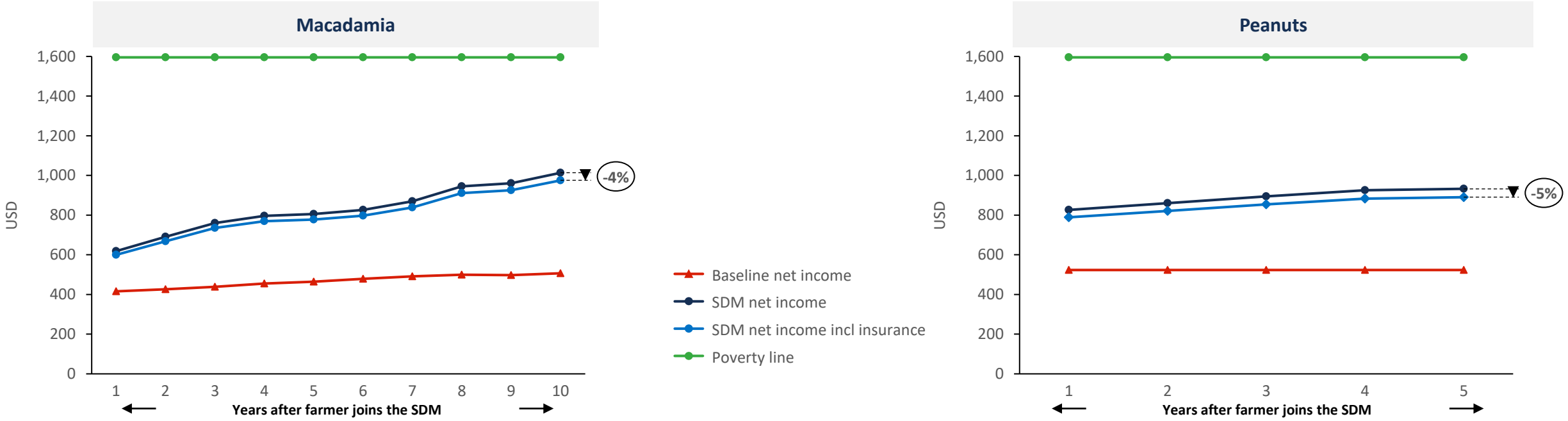
The assumed cost of crop insurance is considered too high for farmers to (voluntarily) adopt such a service

Applying an annual crop insurance of 4.5% over the value of a farmer's produce leads to a decrease in annual net income for both the established macadamia and peanuts SDM farmer of 4% and 5% respectively. The absolute cost of the premium is expected to increase over time for the SDM farmers due to the following two assumptions: 1) the crop insurance premium is based on the hypothetical value of the crop sold and 2) farmers working with Batian Nuts (SDM farmers) are expected to increase their marketable volumes of macadamia and peanuts due to the use of good-quality inputs and application of GAP.

Given that SDM farmer net income is expected to remain far below the PPP adjusted poverty line, it is considered unlikely that farmers will voluntarily pay for crop insurance.

Comparing impact of crop insurance on net incomes of established baseline and SDM farmers

Over time, in USD/year



5. ASSUMPTIONS

Key assumptions and background data and analyses

Glossary

Abbreviation	Meaning
AFA	Agriculture and Food Authority
BC	Buying Center
BNL/ Batian Nuts	Batian Nuts Limited
CAPEX	Capital Expenditure
c.	Approximately
CCC	Cash conversion cycle
DIO	Days inventory outstanding
DPO	Days payable outstanding
DSO	Days sales outstanding
LF	Lead farmer
(M)FI	(Micro) Finance Institution
FGP	Farm gate price
FY	Financial Year
GAP	Good Agricultural Practices
Govt/GoK/Government	Government of Kenya
ICR	Interest Coverage Ratio
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IT	Information Technology
K	Thousands
KALRO	Kenya Agricultural and Livestock Research Organisation

Abbreviation	Meaning
KEPHIS	Kenya Plant Health Inspectorate Service
KES	Kenyan Shilling (currency)
Kg(s)	Kilogramme(s)
Km	Kilometer
KPI	Key Performance Indicators
M	Million
MoA	Ministry of Agriculture
MT	Metric Ton (1,000 kg)
NIS	Nut In Shell
NPBT	Net Profit Before Tax
P&L	Profit & Loss Statement
S1	Segment 1
S2	Segment 2
SACCO	Savings and Credit Co-operative
SDM	Service Delivery Model
SHF	Small Holder Farmer
SWOT	Strengths, Weaknesses, Opportunities & Threats
USD	United States Dollar (currency)
WC	Working Capital
y	Year

Sources

Source	Link (if publicly available)
Agriculture and Food Authority	https://nuts.agricultureauthority.go.ke/index.php/perfomance/statistics
CBI – Centre for the Promotion of Imports	https://www.cbi.eu/sites/default/files/market_information/researches/VCA%20Kenya%20Macadamia%20nuts%202019%20DEF.pdf https://www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/macadamia-nuts/market-potential
Center for Financial Inclusion	https://www.centerforfinancialinclusion.org/how-mobile-money-is-closing-the-agricultural-finance-gap-for-women-in-kenya
CGIAR	https://ccafs.cgiar.org/publications/climate-risk-profile-meru-county-kenya-county-climate-risk-profile-series#.X5bSm4gzbDc
FAO	http://www.fao.org/fileadmin/user_upload/fsn/docs/Ag_policy_Kenya.pdf
FAOSTAT	http://www.fao.org/faostat/en/#data/QC
Farm link Kenya	http://www.farmlinkkenya.com/ground-nuts-farming/
ICRISAT	https://www.icrisat.org/improved-varieties-and-market-linkages-are-the-key-it-pays-to-grow-groundnut-kenyan-farmers-show-the-way/
International Nut and Dried Fruit	https://www.nutfruit.org/industry/technical-resources?category=statistical-yearbooks
KALRO	https://www.kalro.org/sites/default/files/Macadamia_Seedlings_Mobile_App_TEMPLATE_March_2019_DRAFT_LW_TN.pdf
KNBS (2014): Demographic and Health Survey	https://dhsprogram.com/pubs/pdf/fr308/fr308.pdf
KNBS – Economic Survey 2020	https://www.knbs.or.ke/?wpdmpro=economic-survey-2020
KNBS – Enhanced Food Balance Sheet for Kenya 2104 – 2018 Results	https://www.knbs.or.ke/?wpdmpro=enhanced-food-balance-sheets-for-kenya-2014-2018-results
KNBS – Statistical Abstract 2019	https://www.knbs.or.ke/?wpdmpro=statistical-abstract-2019
Research and markets	Macadamia Market - Growth, Trends and Forecasts (2020 - 2025)
Rich Farm Kenya	https://www.richfarmkenya.com/2020/01/macadamia-prices-in-kenya-to-possibly.html
The Brogen Project	https://borgenproject.org/macadamia-nut-farming-in-kenya/
Tridge	https://www.tridge.com/stories/the-increasing-presence-of-kenyan-macadamias-in-the-global-market https://blog.tridge.com/the-increasing-presence-of-kenyan-macadamias-in-the-global-market-2bacf6e3016a
University of Nairobi Research	https://geospatial.uonbi.ac.ke/sites/default/files/cae/engineering/geospacial/PROJECT%20REPORT.pdf
World Bank	https://openknowledge.worldbank.org/handle/10986/23350

Key assumptions – Macadamia Farmer

	Established	New
Farm size (ha)	**Y1:** 0.25, **y10:** 0.275	**Y1:** 0.20, **y10:** 0.25
Harvests (#/year)	2	
Total trees (#/ha)	187	
Tree portfolio		

Established

Tree age portfolio	Portfolio %	Variety	Grafting	Yield curve tree
1-4 years	[redacted]	Improved	Grafted	Grafted seedling
5-8years	[redacted]	Improved	Ungrafted	Ungrafted
9-15years	[redacted]	Improved	Ungrafted	Ungrafted
16-40 years	[redacted]	Local	Ungrafted	Ungrafted
40+years	[redacted]	Local	Ungrafted	Ungrafted

New

Tree age portfolio	Portfolio %	Variety	Grafting	Yield curve tree
1-4 years	[redacted]	Improved	Grafted	Grafted seedling
5-8years	[redacted]	Improved	Grafted	Grafted seedling
9-15years	[redacted]	Improved	Grafted	Grafted seedling
16-40 years	[redacted]	Improved	Grafted	Grafted seedling
40+years	[redacted]	Improved	Grafted	Grafted seedling

Production (Kg/year)	**y1:** [redacted], **y10:** [redacted]	**y1:** n/a, **y10:** [redacted]
Post-harvest loss (%)	**y1:** 30%, **y10:** 14%	**y1:** 30%, **y10:** 23%
Side selling (%)	**y1:** 70% , **y10:** 60%	**y1:** 50%, **y10:** 40%
High quality produce (%)	**Y1:** 70% , **Y10:** 90%	**Y1:** 60% , **Y10:** 90%
Macadamia FGP Batian Nuts (KES/MT)	**y1:** 100,000 KES/MT, **y10:** 100,000 KES/MT	
Intercropping net income (KES/tree/year)	220 KES/tree/year	
Other crop net income (KES/year)	30,000 KES/year	2,059 KES/year
Tractor hire (KES/ha)	5,000 KES/ha	
De-husking fee (KES/Kg)	1.67 KES/Kg	
Seedlings price (KES/seedling)	350 KES/seedling	
Finance cost (%)	Local MFI: 12.5% , Traditional FI: 14% and BNL: 8.5%	
Transport (KES/MT)	1,000 KES/MT	

Key assumptions – Peanuts Farmer

	Established	New
Farm size (ha)	0.35	0.20
Seasons (#/year)	2	
Yield (Kg/season)	**Y1:** [redacted], **Y5:** [redacted]	**Y1:** [redacted], **Y5:** [redacted]
Post-harvest loss (%)	**Y1:** 3% , **Y5:** 2%	**Y1:** 10% , **Y5:** 4%
Own consumption (Kg/season)	11	
Aflatoxin rejection (%)	10%	
Side selling (%)	**y1:** N/A , **y10:** 35%	**y1:** N/A , **y10:** 35%
High quality produce (%)	90%	**Y1:** 50% , **Y5:** 90%
Peanuts FGP Batian Nuts (KES/MT)	79,600 KES/MT	
Other crop net income (KES/year)	60,000 KES	41,833 KES
Tractor hire – land preparation (KES/ha)	5,000 KES/ha	
Tractor hire – ridging(KES/ha)	3,000 KES/ha	
De-shelling fee (KES/kg)	1.67 KES/Kg	
Seed price (KES/kg)	250 KES/Kg	
Finance cost (%)	Local MFI: 12.5% , Traditional FI: 14% and BNL: 8.5%	
Transport (KES/MT)	500 KES/MT	

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