

Sourcing of horticultural produce from smallholder farmers for supply to Kenyan and export markets

Farmworks Farming Services Ltd.

Service Delivery Model Analysis

June 2023



idh
transforming markets



Introduction

Smallholder livelihoods

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 and is affected by 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

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. Using IDH's data-driven SDM methodology, IDH analyzes these models to create a solid understanding of the relation between impact on the farmer and impact on the service provider's business.

Insights & Innovations

Our data and insights enable businesses to formulate new strategies for operating and funding service delivery, making the model more sustainable, less dependent on external funding and more commercially viable. By further prototyping efficiency improvements in service delivery and gathering aggregate insights across sectors and geographies, IDH aims to inform the agricultural sector and catalyze innovations and investment in service delivery that positively impact people, planet, and profit.

IDH Farmfit Africa

The study was commissioned under IDH Farmfit Africa Program. The program has 3 key pillars;

1. FARMFIT BUSINESS SUPPORT

Farmfit Business Support provides businesses and banks the tools they need to optimize cost-efficiency and maximize the impact of their engagement with SHFs. It helps identify areas ripe for innovation and matches them with the most suitable finance, to bring them to scale. Farmworks is one of the companies selected to receive technical assistance under this pillar. The SDM analysis will help identify opportunities for Farmworks to change and optimize their sourcing and service model based on which TA interventions will be designed.

2. FARMFIT INTELLIGENCE CENTRE

Farmfit Intelligence Centre shares key insights on how to make smallholder value chains more efficient and effective. Its benchmarking database contains insights from 100+ SHFs engagement models, helping partners innovate in technology and gender inclusion.

3. FARMFIT FUND

Farmfit Fund is the world's biggest ever public-private impact fund for smallholder farmers. The Fund's innovative structure de-risks investments in smallholder farming and helps drive sustainable impact by showcasing the commercial opportunity represented by smallholder farming finance.



Report outline

To navigate between the different chapters, simply [click on the corresponding name](#) in the reading guide on the right of each page, and you will be taken to the first page of that chapter

1 Executive summary

2 State of the sector

3 Business case

4 Impact case

5 Annex





1

Executive summary



Introduction | About Farmworks and the horticulture sector in Kenya



Farmworks Limited

- Farmworks was founded in 2020 and is a grower, aggregator and distributor of horticulture produce.
- The business, which operates in Kenya, is developing its own mid-size farms as anchors for small-scale farmers and has three business units that include own farms, out-growers (OG) and distribution.
- Own farms are based in Mwea, Embu and Kilimambogo with a total of 175 acres largely producing tomato, French beans and onions in rotation. These farms are also used in trials for new crops before rolling out production through the OG program.
- Its OG program has contracted 600 farmers and engages in the production of sweet corn, baby corn and French beans. The business is currently trialing production of orange flesh sweet potatoes and snow peas with OGs. The business aims to optimize and scale its OG program to 17,000 farmers by 2027.
- Its distribution unit operates 12 branches marketing all produce in the domestic market, serving 200 small informal vegetable vendors, and previously to export companies.
- The business has started directly exporting produce in 2023.



Horticulture in Kenya

- Horticulture is the largest sub-sector in agriculture and has created 350,000 direct jobs supporting over 6 million livelihoods in Kenya.
- The sub-sector's three main components are cut flowers, fruits and fresh vegetables, where fruits and vegetables are largely produced by small to medium scale farmers.
- Horticulture was the largest foreign exchange earner in 2021, primarily due to the substantial volumes of floriculture exports. The Fresh Produce Exporters Association of Kenya (FPEAK) estimates that only 4% of all the fruits and vegetables produced is exported while the rest is being consumed locally. ¹⁾
- Vegetable production in Kenya has risen since 1972, from 347,000 tons to 3.34 million tons in 2021, an annual growth rate of 5.46%. ²⁾
- Despite the strong performance of the sub-sector, the sector encounters challenges related to productivity and post harvest losses (PHLs) including:
 - limitations on credit availability for financing agri-inputs and capital investments;
 - infrastructure gaps such as irrigation, electricity for cold storage and inadequate processing facilities close to farms;
 - absence of an effective market information system.

Sources: Farmworks interviews, 1. [FPEAK](#), 2. [Knoema.com](#)



Recommendations (1/5) | Farmworks will need to raise financing and actively build both domestic and export markets for its produce to facilitate reaching the projected scale

Observations	Recommendations
Farmwork's business case	<i>For business sensitivity reasons, we have excluded this section from the report.</i>

Notes: *1 Plot = 1/8 acre
These topics, challenges and recommendations were derived from a set of learning questions that were formulated up front. A list of these learning questions can be found [in the annex](#)



Recommendations (2/5) | The FMS will be critical to ensure that Farmworks segments farmers in an optimal manner while enhancing efficiency in input delivery to farmers and production.

	Observations	Recommendations
Service delivery model 1/2	<ul style="list-style-type: none">• Scalability - Farmworks aims to <u>establish a service provision infrastructure</u> with three schemes that consist of maximum 15 centers made up of a maximum of 400 farmers.• Financial viability - Alongside <u>training, independent spraying (labor & equipment), and market access, the provision of input packages</u> (seeds, fertilizer, and crop protection) requires the <u>highest cash flow</u> for Farmworks.• Efficiency - As the scheme matures, losses on input provision reduce, and eventually yield a positive return. This results from decreasing default rates for farmers who are retained in the scheme.• Efficiency - While cost to serve per farmer segment is comparable, the customer value per segment differs significantly, and results from differences in margins earned for vegetable volumes sourced.• Risk & Resilience / Investability - Farmworks provides input packages on credit and recoups the COGS from farmers at harvest. Sensitivity analysis on loyalty and default rates show the importance of farmer loyalty to the sustainability of Farmworks' service delivery, as Farmworks can earn a higher margin from selling the produce grown from one input package compared to the value derived from selling one input package.	<ul style="list-style-type: none">• Invest in capacity building for staff at collection centers as they are the backbone to a successful model at scale to drive efficiency and effectiveness of the scheme. Farmworks can also create a graduation scheme to incentivize its part-time personnel where for example independent sprayers can move to fulltime employment on performance• Leverage the FMIS to more accurately forecast demand for input packages to ensure adequate planning for Working Capital requirements• Continue the implementation of farmer segmentation and graduation approach based on defined key farmer characteristics, which will enable delivery of more tailored and effective services. Farmworks can explore incentives to its graduation, such as discounts on input packages, and/or premiums on vegetable produce, shorter payment periods for performing farmers which can improve the loyalty of farmers.

These topics, challenges and recommendations were derived from a set of learning questions that were formulated up front. A list of these learning questions can be found [in the annex](#)



Recommendations (3/5) | To build a sustainable business case in all layers of the scheme, Farmworks will need to create efficiencies internally while incentivizing farmers to drive loyalty.

Observations	Recommendations
<div>Service delivery (services / structure) 2/2</div> <ul style="list-style-type: none">• Risk & Resilience / Investability - Sensitivity analysis on default rates and margin charged indicates that ensuring low default rates is more critical to performance than loading a mark-up on input package cost.• Financial viability / Investability – With the current operational strategy, Farmworks’ schemes achieve a sustainable business case after 2 to 3 years	<ul style="list-style-type: none">• Incentivize farmers with discounts on input packages and/or premiums on vegetable produce, which can improve the loyalty and retainment of farmers ultimately reducing default rates.• Ensure efficiencies at center, scheme and packhouse levels through performing production and sourcing planning based on the SDM analysis. This will ensure alignment of number of farmers and/or the required sourcing volumes to working capital, processing capacity at the packhouse, and capacity at the center and scheme level.• Build and showcase the evidence of a successful service delivery model to attract financing partners for a potential working capital facility for its farmer base.

These topics, challenges and recommendations were derived from a set of learning questions that were formulated up front. A list of these learning questions can be found [in the annex](#)



Recommendations (4/5) | Investing in farmer trainings and monitoring will be critical to ensure farmers attain the projected increase in incomes

	Observations	Recommendations
Farmer segmentation	<ul style="list-style-type: none"> • Effectiveness / Risk & Resilience – Farmworks aims to segment its farmers <u>based on agro-climatic locations</u>, which influence the portfolio mix of vegetables grown per farmer. • Effectiveness – After three years, farmers can access drip-irrigation on top of the basic input package provided to them by Farmworks. The financing for drip kits and will be refined and deployed in 2023 onwards. • Scalability - Farmers are expected to increase the <u>number of plots they cultivate for Farmworks</u>, based on their successful performance (total production and repayment) which will inform farmer graduation. 	<ul style="list-style-type: none"> • Implement a FMIS to collect data on performance of the different farmer segments (segregated by regions and crops) and leverage data collected to tailor services to farmers to influence loyalty. • Implement a farmer segmentation and graduation approach to incentivize loyalty and income increase for farmers and scale and income for Farmworks.
Farmer performance (1/2)	<ul style="list-style-type: none"> • Effectiveness - Although the <u>cost of the service package varies between segments (93 – 126 USD/plot)</u>, the <u>average annual income each segment attains ranges from 780 – 1,860 USD/year</u> and is <u>driven by the vegetable mix that is grown by each segment and the use of drip irrigation</u>. • Effectiveness - By working with Farmworks, farmers <u>increase their income by up to USD 376 and USD 781 for non-drip and drip irrigated farms respectively in 5 years</u> compared to the baseline counterparts. • Effectiveness (Drip 1/2)– With the adoption of GAP, farmers increase their productivity per plot by 30% in 5 years, while increasing their productivity by 50% with use of drip irrigation. 	<ul style="list-style-type: none"> • Invest in training farmers in GAP to improve yields. • Continuous monitoring of farmer application of GAP to provide Farmworks with control of the production processes, and thus manage risks of food safety concerns and/or MRLs that arise from entering export markets.

These topics, challenges and recommendations were derived from a set of learning questions that were formulated up front. A list of these learning questions can be found [in the annex](#)



Recommendations (5/5) | Farmworks should train farmers on and encourage diversification as this ensures that farmers have sufficient cashflows year-round to invest in Farmworks crops

	Observations	Recommendations
Farmer performance (2/2)	<ul style="list-style-type: none">• Risk & Resilience (Drip 2/2) – Projections show that farmers investing in drip-irrigation kits <u>attain an income of USD 405 higher than farmers using other irrigation methods</u>. Drip irrigation farms are however more <u>sensitive to price and yield changes</u> compared to their non-drip counterparts. Since drip irrigated farms are expected to produce better quality yields, Farmworks may be able to explore premiums for better quality vegetables from these farms, further incentivising farmers transition to drip irrigation• Risk & Resilience - Farmers receive the input package on credit, which is recouped from the crop sales, and hence farmers require <u>sufficient cash flows for labor and equipment</u> during months where they cultivate the different vegetables.	<ul style="list-style-type: none">• Test and prove the business case for drip irrigation to enable Farmworks to work with a third-party financier for farmer drip kit financing.• Encourage farmers to diversify to other income to enable them access to sufficient cashflow to cover for negative cashflow periods for Farmworks' production

These topics, challenges and recommendations were derived from a set of learning questions that were formulated up front. A list of these learning questions can be found [in the annex](#)



2

The Service Delivery Model





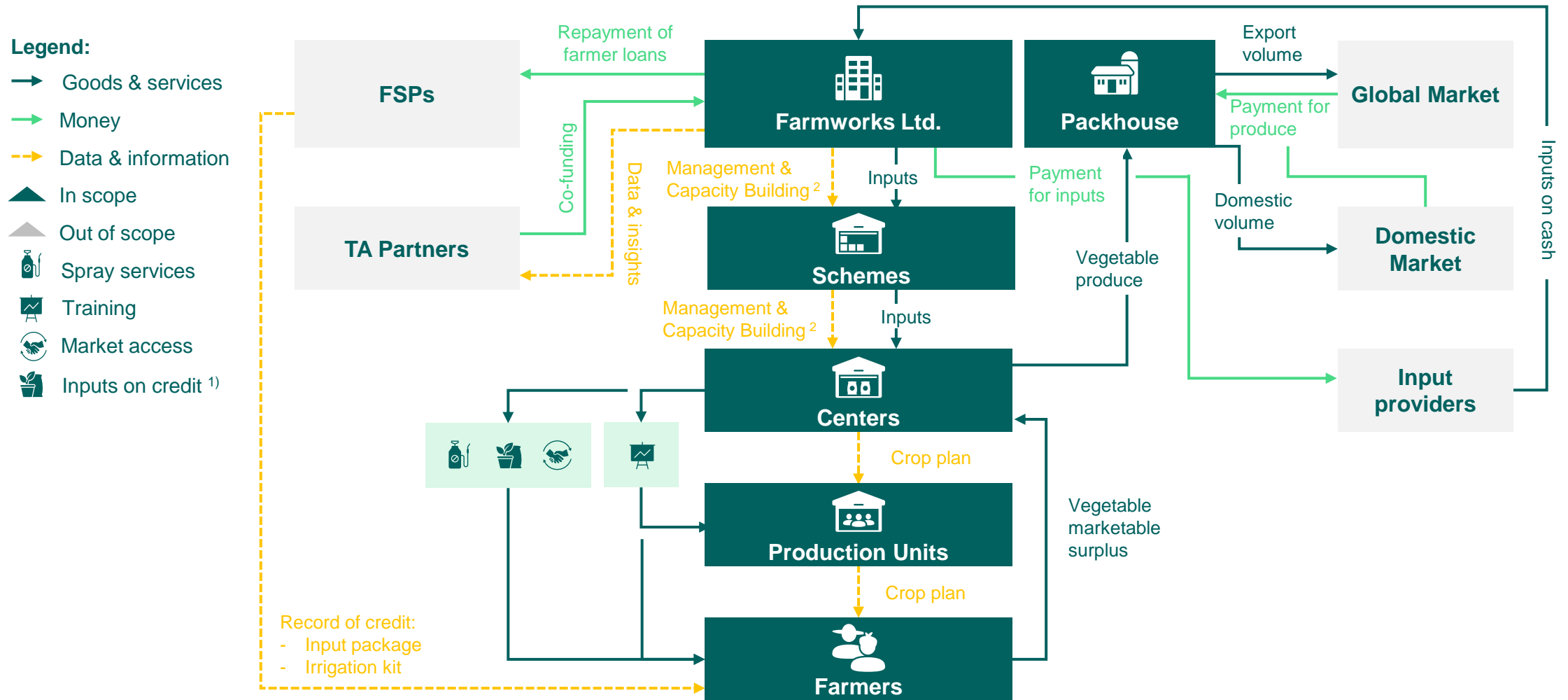
Objectives and/or targets | The SDM is aimed at driving the commercial viability of Farmworks through increasing smallholder farmer resilience and productivity

	Objective	Envisioned outcomes per stakeholder		
		Farmers	Farmworks	IDH
Core objective	Develop a robust and commercially viable smallholder horticultural out-grower sourcing model	<ul style="list-style-type: none"> Higher farm yields Improved long-term business case and income resilience. 	<ul style="list-style-type: none"> Improved farmer loyalty Stable sales growth from higher horticulture sourced volumes Contribution to farmer impact 	<ul style="list-style-type: none"> Contribute to security of supply of horticultural food crops to local markets
Secondary objectives	Increasing productivity, profitability and resilience of smallholder farmers.	<ul style="list-style-type: none"> Better yields and income resilience 	<ul style="list-style-type: none"> Stable sales growth from higher horticulture sourced volumes Contribution to farmer impact 	<ul style="list-style-type: none"> Improve the long-term sustainability of the business Contribute to security of supply of horticultural food crops to local markets
	Improve business systems to support growth of business' out-grower farmer model	<ul style="list-style-type: none"> Increased farm yields from improved support. 	<ul style="list-style-type: none"> Improve the business case for its farmers Increase sourced horticulture volumes 	<ul style="list-style-type: none"> Improve the long-term sustainability of the business Acquire learnings within the horticulture sub-sector in Kenya
	Increase sustainability of farming practices	<ul style="list-style-type: none"> Better yields and income resilience 	<ul style="list-style-type: none"> Contribution to farmer impact 	<ul style="list-style-type: none"> Increased sustainability of the horticulture sector

Sources: Farmworks documents and management interviews



SDM overview | Farmworks' service delivery is anchored on farmer production units that are serviced through collection centers which collectively make up the out-grower scheme

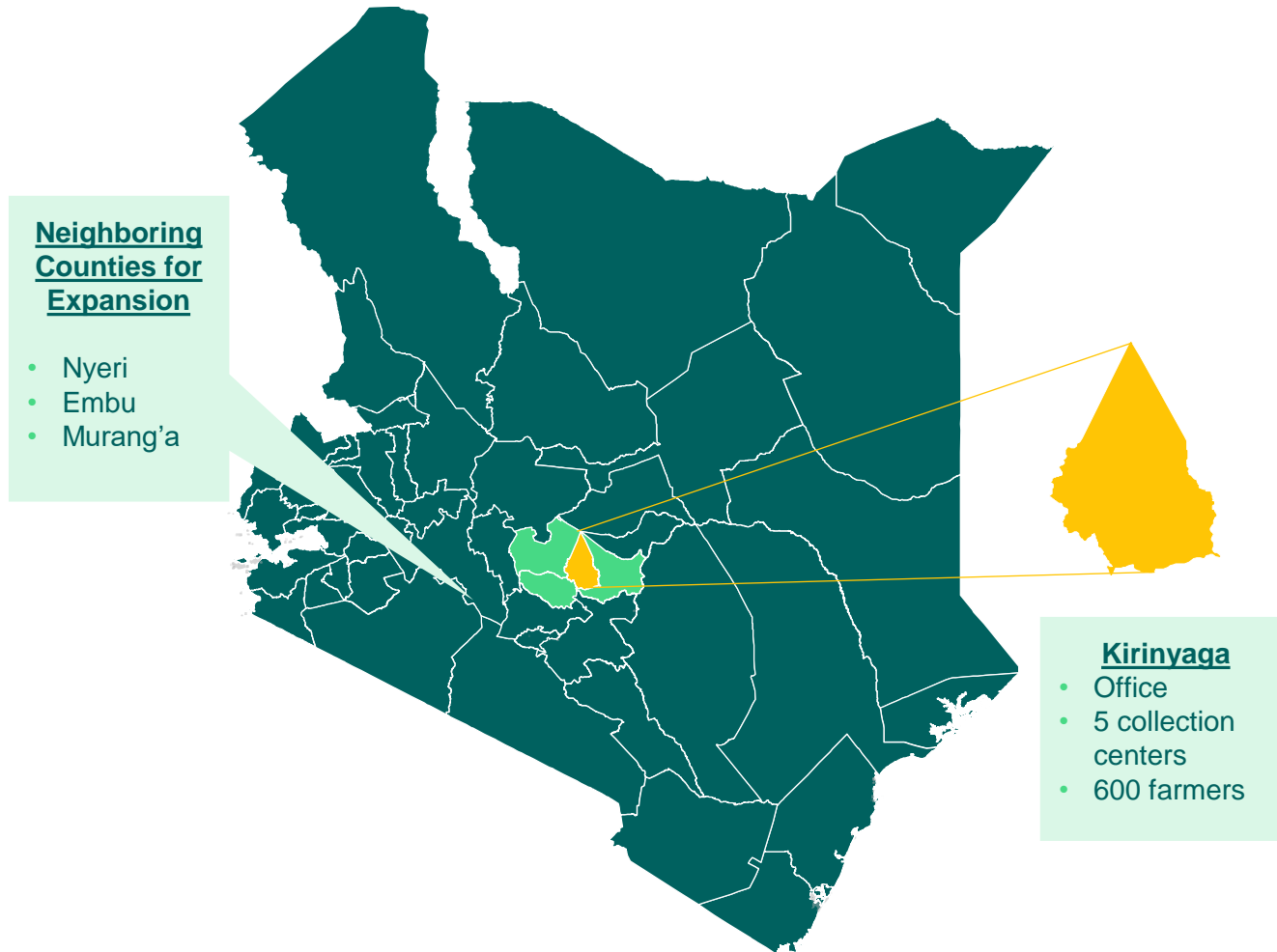


Source: Farmworks interviews (2022);

Notes: 1) The content of the input package on credit depends on the vegetable portfolio (crop plan) determined for each Production Unit. 2. Capacity building of staff at the centres and schemes is done by Farmworks Institute.








Location | The horticulture scheme is currently being implemented in Kirinyaga county with plans to expand to the neighboring Nyeri, Embu and Murang'a counties.



Sources 1. <https://yourfreetemplates.com/free-kenya-editable-map/> 2. Farmworks interviews (2022)



Stakeholders | The project design presents clear revenue model and value proposition for all the actors involved which is critical for success of the services to be provided to farmers.

Actor	Function (within this SDM)	Revenue model	Incentive to participate (within this SDM)
 Equipment suppliers	<ul style="list-style-type: none"> Provision of high-quality irrigation kits (drip lines, pumps) 	Margin on sales	<ul style="list-style-type: none"> Attract new customers Contribute to the alleviation of poverty in rural communities
 Input suppliers	<ul style="list-style-type: none"> Provision of high-quality inputs (fertilizer, chemicals, seeds/seedlings) 	Margin on input sales	<ul style="list-style-type: none"> Attract new customers Contribute to the alleviation of poverty in rural communities
 Commercial Banks*	<ul style="list-style-type: none"> Provide access to finance at reasonable rates and terms 	Payment of interest	<ul style="list-style-type: none"> Attract new agri-customers Increase experience of conducting business with horticulture farmers Increase farmers access to banks services and products
 Exporters	<ul style="list-style-type: none"> Provide market for exportable produce from out-growers and Farmworks nucleus farms 	Margin on sales	<ul style="list-style-type: none"> Meet export customer orders
 Packhouse Facilities	<ul style="list-style-type: none"> Provide leasing space for packhouse facilities for Farmworks operations 	Rent or lease fees	<ul style="list-style-type: none"> Attract new clients





Source: Farmworks interviews (2022)

Note: *Farmworks is in conversations with commercial banks.



Services | Farmworks provides a service package aimed to increase and secure sourcing volumes directly from its out-grower farmers.

● Ongoing ● Under design ● Piloting




Category	Service	Impact	Implementation	Revenue model	Status
 Training & information	Agronomy training	Increase good management practices to utilize impact of access to other services.	Farmworks through FFS*	Indirect through sourcing volume	●
	Financial literacy training	Increase understanding of farm economics and the business case of horticulture farming to increase understanding of repayment of loans and rationale behind investments	Farmworks through FFS	Indirect through sourcing volume	●
 Inputs	High quality seeds	Increase the yield of farmers accessing seeds through Farmworks	Farmworks	None	●
	Spray services	Reduce the risk of crop losses due to diseases while maintaining control of crop spraying regime.	Farmworks	Indirect through sourcing volume	●
 Financial services	Financing for seeds	Support farmer working capital to enable access to quality seedlings.	Farmworks	Indirect through sourcing volume	●
	Financing for irrigation kits**	Support farmer CAPEX to enable access to drip irrigation kits	Farmworks	Indirect through sourcing volume	●
 Post-harvest	Crop aggregation	Provide off take of horticulture produce from farmers in the scheme	Farmworks	Margin on sales	●

Source: Farmworks interviews (2022)

Notes: *Farmworks also collaborates with well performing farmers to provide trainings through select demo farms **Drip irrigation kit financing is under piloting since 2022 and will be provided only to select farmers starting later in 2023



Farmer segments | Farmer segmentation is based on agro-climatic conditions of the regions that Farmworks operates in which influence the crop mix.

Characteristics	 Segment 1: Nyeri	 Segment 2: Sagana	 Segment 3: Mwea
Description	Farmers in the Nyeri area (cool climate), receiving Farmworks services.	Farmers in the Sagana area (moderate climate), receiving Farmworks services.	Farmers in the Mwea area (warm climate), receiving Farmworks services.
Challenges	<ul style="list-style-type: none"> Poor production practices Pests and diseases 	<ul style="list-style-type: none"> Poor harvest and post-harvest practices Poor market access leading to loss of crop or low prices 	
Crop portfolio (% plots dedicated) *			
French beans	50%	50%	50%
Baby corn	20%	20%	20%
Sweet corn	0%	15%	15%
Snow peas	30%	0%	0%
Sweet potato	0%	15%	15%
Drip irrigation (% of farmer base)	Y0 (2022) = 1% Y5 (2027) = 45%	Y0 (2022) = 1% Y5 (2027) = 45%	Y0 (2022) = 1% Y5 (2027) = 45%
Number of plots/farmer average of farmer base ³⁾	Y0 (2022) = 2.5 Y5 (2027) = 3.0	Y0 (2022) = 2.5 Y5 (2027) = 3.0	Y0 (2022) = 2.5 Y5 (2027) = 3.0
Attrition rate (% of farmer base)	Y1 = 30% Y2-3 = 10% Y4 > = 0%	Y1 = 30% Y2-3 = 10% Y4 > = 0%	Y1 = 30% Y2-3 = 10% Y4 > = 0%
Number of centers (#/cumulative)	2022: 0 , 2023: 1 , 2024: 5 , 2025: 10 , 2026: 15 , and 2027: 15	2022: 3 , 2023: 6 , 2024: 15 , 2025: 15 , 2026: 15 , and 2027: 15	2022: 3 , 2023: 5 , 2024: 10 , 2025: 15 , 2026: 15 , and 2027: 15

Notes: 1) For more assumptions see [SDM level assumptions in the annex](#); 2) For the farm-level analysis, a dedicated vegetable portfolio is modelled. See [here for the farm-level segments](#); 3) One plot is 1/8 acre dedicated to the SDM. * The distribution of plots to the indicated vegetables is achieved at scheme maturity (year 5).



Farmer relationships | Farmworks has taken an active role in organizing its farmer base into farmer groups at PU level for ease of administration of the scheme.



Outreach

- Farmworks takes an active role in farmer recruitment and works with its extension officers to create awareness of its field agents
- Farmers need to be organized into production units (PUs) of 15 to 40 farmers to apply to be Farmworks out-growers
- Farmworks supports its farmers in getting registered in formal community-based organization (CBO)



Selection

- Farmers are required to be an active member of a PU and are further evaluated on the below basis:
- access to a minimum 500 square meter plot (1/8 Acres) for a min 12 months. Ideal 2 plots
 - access to reliable irrigation water and ability to irrigate
 - ability to provide adequate labor for the crop preferably through own/family labor



Contracting

- Farmworks signs one-year formal renewable contracts with the farmer PUs which stipulates the size of land committed to Farmworks production, crop mix, product quality and other roles and responsibilities of the farmer and Farmworks.
- The groups serve a co-guaranteeing function for input financing packages and to reduce the risks of side-selling of crops by serving as a self-policing measure.



Segmentation

- Farmworks has not employed a clear farmer segmentation strategy in the past but plans to roll out a strategy that is based on geographic operations (Nyeri, Sagana and Mwea regions) which influences the crop mix. Segmentation will further be based on farmer access to drip irrigation



Graduation

- Farmworks currently provides uniform services for its farmer base.
- Its strategy for farmer graduation going forward is on the basis of providing drip irrigation to performing farmers who have been in the scheme for 2 years



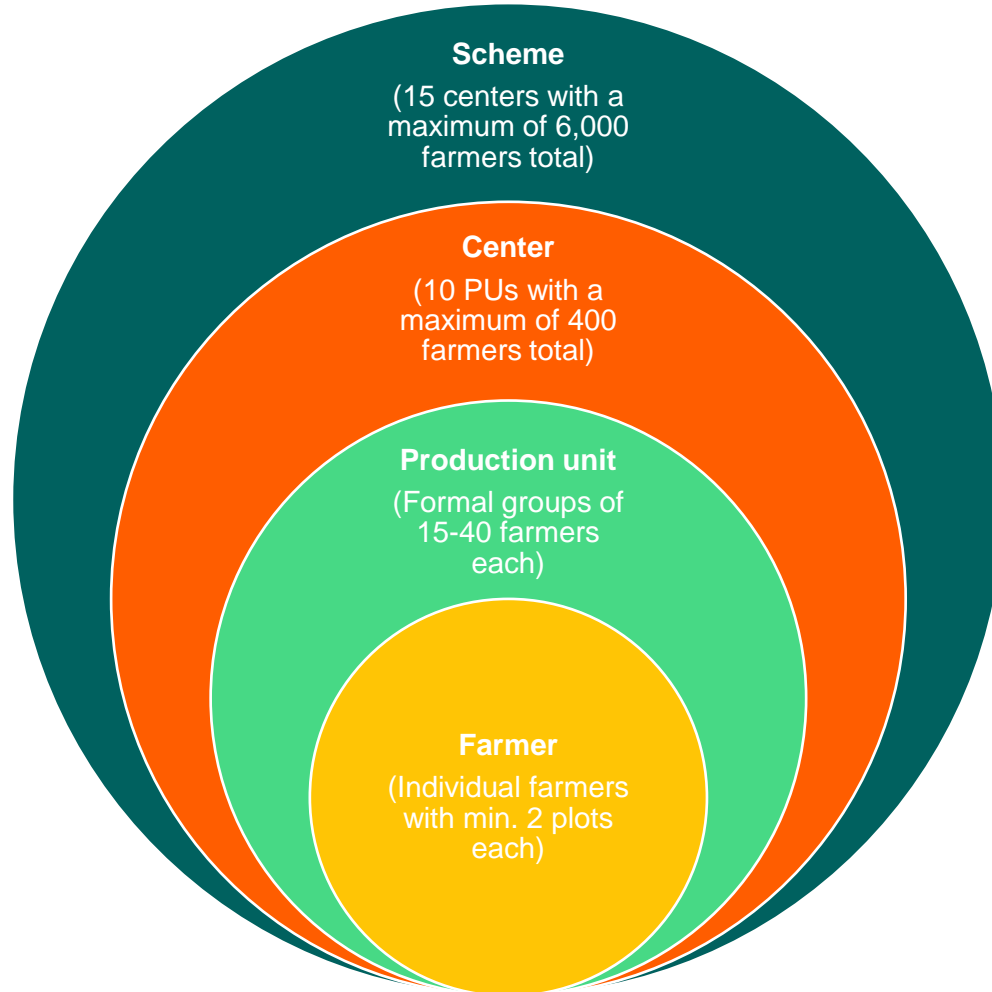
Data collection

- Farmworks data collection is done via paper system. Once the FMIS is acquired, Farmworks aims to collect more data from its farmers in a standardized manner.
- The FMS will allow to more efficiently deliver services to farmers, track farm performance and farmer history to allow for potential service tailoring

Source: Farmworks interviews (2022)



Out-grower scheme | Farmworks has taken an active role in organizing its farmer base into farmer groups at PU level for ease of administration of the scheme.

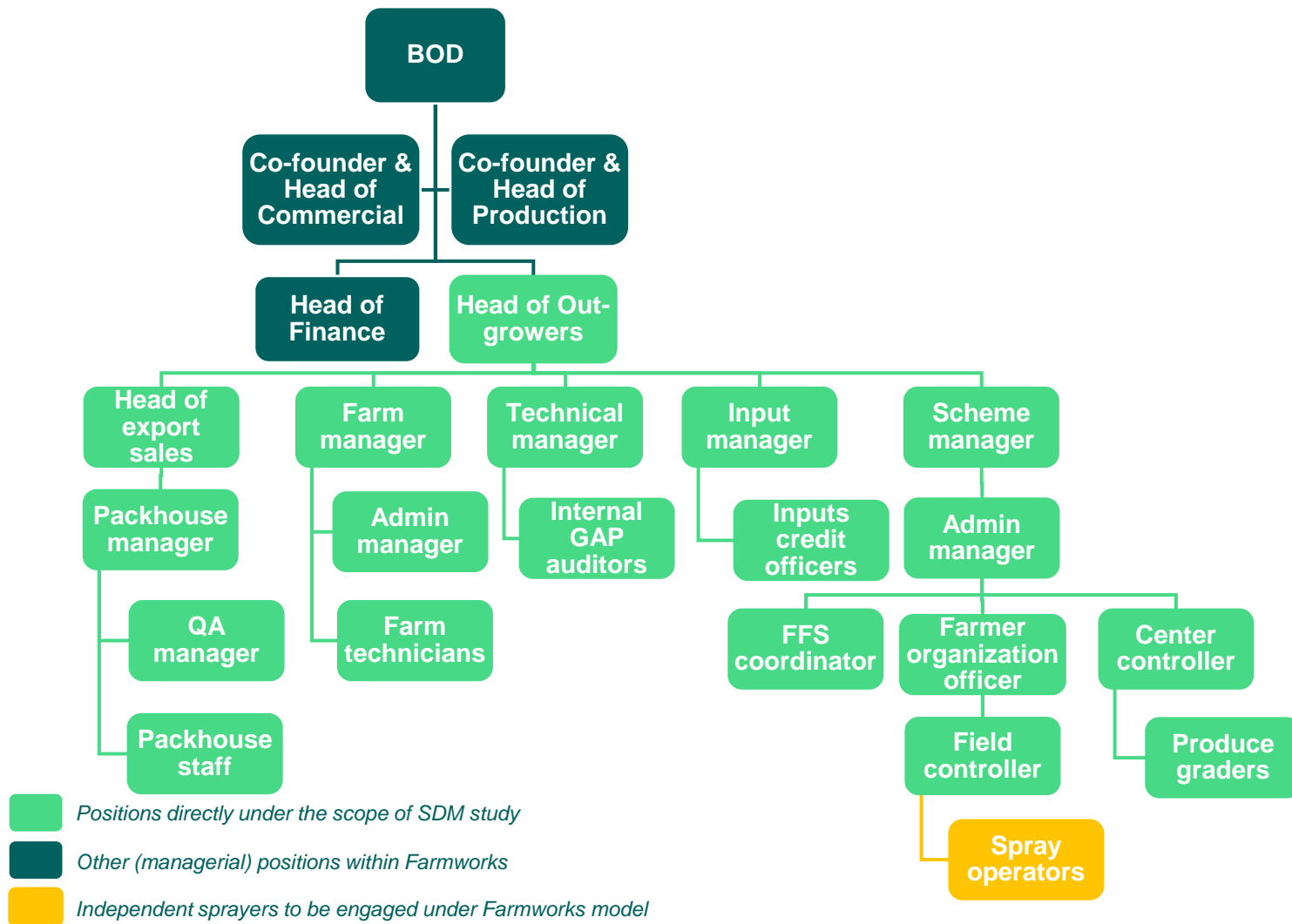


- Farmers, organized into groups of 15-40 form a farmer group (PU) and express interest to work with Farmworks through Farmworks' extension officers.
- Farmworks carries out a review of the applications based on a pre-defined criteria which includes access to irrigation water and individual commitment of at least 1 plot for 12 months.
- Upon meeting the criteria, Farmworks supports in formally registering as CBOs through cooperation with the Ministry of Labor and Social Protection.
- Farmworks' communication with the farmers is mainly through the groups with the groups supporting Farmworks in reducing administrative costs of providing services such as input provision and spray services, training and aggregation of produce from farmers.
- The groups also serve as a de-risking mechanism for Farmworks through farmer co-guarantees to members for input financing packages, group members supporting each other in crop management.
- In addition, the groups reduce the risks of side-selling of crops by serving as a self-policing mechanism.

Source: Farmworks interviews (2022)



Organizational structure | Farmworks operates an organizational structure, where staff is incentivized to graduate through the organization with the support from capacity building.



Sources: Farmworks' out-growers organization structure
Note: The organogram focusses on staffing of the out-grower unit.

- Farmworks has a total of 69 fulltime staff gender disaggregated into 61% males and 31% females.
- The business also employs casual staff, who are majority female, and their numbers vary across seasons. They are largely employed in Farmworks own farms and in the packhouse mainly during planting and harvest seasons
- Number of fulltime staff in each department:
 - Finance - 4 females and 2 males
 - Out-growers – 1 female and 11 males
 - Packhouse – 2 females and 2 males
 - Farm – 4 females and 17 males
- Farmworks also plans to engage independent sprayers to carry out spraying on contracted farms as part of its efforts to increase food safety by ensuring compliance with regulations on pesticide use.



Gender assessment | Given the involvement of women in the value chain, Farmworks will need to create sensitization at the farm level to better support women within the SDM

Questions	Answer	Explanation
Gender strategy: Is gender equality a strategic goal for Farmworks which is communicated in documents?	No	Gender is not an explicit focus though is recognized as important given the composition of staff and horticultural labor activities that are largely conducted by women. The company conducts gender equity and sexual harassment awareness trainings for its staff.
Data collection: Does Farmworks collect data on staff or customers/farmers disaggregated by gender?	Yes	Farm and employment data is collected on a gender-disaggregated basis. This data is not analyzed to investigate gender trends.
Inclusive workplace: Does Farmworks have policies or practices to make the workplace inclusive for both women and men?	Yes	Farmworks has a HR policy which captures equal payment and sexual harassment aspects. Training of staff focuses on gender and sexual harassment. Given the high involvement of women in the value chain, Farmworks is deliberate in employing women in certain positions.
Inclusive consultation: Does Farmworks speak to or consult both male and female customers (farmers) to learn about their different needs and preferences when designing a product	No	There are internal welfare committees which are also used to capture gender issues in the workplace. However, at farm level, there is no additional consultation that takes place to identify the unique needs of women.
Inclusive tailoring: Does Farmworks tailor services based on how needs may be different for men and women?	Yes	Farmworks offers the same input package to all farmers. Consideration of women is done when conducting trainings and when offering other services (timing and consultation). 80% of trainings are conducted at the production units which enables offering of more tailored advice.
Independence and control over resources: Do services enable women to improve their independence, control over resources and/or value capture?	Yes	Contracts are signed with individuals and without discrimination of services by gender. Farmworks facilitates opportunities for women to reach leadership and managerial positions (with no specific gender targets)



Recommendations | Farmworks and its farmers could benefit from directly implementing inclusive policies and services while lifting key barriers to women economic empowerment

Where is Farmworks on its gender journey?



Farmworks is gender intentional

Farmworks has taken steps to at least understand the different needs and constraints of women and men in its internal process, strategy or service design with the goal of ensuring both women and men have access to resources.

The business can improve on its data collection to be able to tailor services to ensure either that men and women have access to resources, control over the benefits of those resources or are working in an inclusive workplace

Farmworks could strengthen its gender strategy:

Taking a data-driven approach to understand the different needs and constraints of women and men in its internal and external processes with the goal of ensuring that both women and men have access to resources, have similar control over the benefits of those resources and/or are working in an inclusive workplace.

Sources: IDH Gender tool, Farmworks interviews

Notes: 1. 1) Suri, T., Jack., W., (2016); *The long-run poverty and gender impacts of mobile money* 2. Davies, M. Baars, M., (2017)

Best practices to implement

Collect and analyze gender-disaggregated data for:

1. on farmers to better understand consumption patterns and preferences that can help to better serve farmers
2. On staff ability to reach male and female farmers to identify those able to attract a diverse group and capture lessons
3. on employee recruitment, retention among women and men, pay, promotion, skills training, to understand opportunities to better support employees, reduce turnover, and ultimately save recruitment costs

Consult women and men about norms around movement to better understand preferences around meeting time, location or format

Consider how differences in gender roles, expectations, and access/ownership/use of assets affects mobility, time use, access to markets, and decision-making

Offer formal training (technical and leadership) as part of service or product delivery in order to overcome gendered skill gaps

Encourage PU membership and decision making by advocating for women to serve as leaders in the PUs and to take active roles in recruitment and training of farmers.

Consider applying participatory methods and formats where women and other potentially marginalized voices will be empowered to speak first and freely, such as gendered breakout groups or single-gender consultations

Barriers to be lifted

Economic: women's access and control of resources particularly land and finance is comparatively lower than that of men.
Practical: access to high quality inputs is a challenge to most women

Adapting training to women's capacities, literacy rates, time schedules and location leads to **improved yields and quality of produce¹**, leading to higher supply.

Results in enhanced **business reputation, competitiveness and performance**

Creating a **gender strategy** and embedding this into the business can lead to improved **farmer and employee engagement and retention**

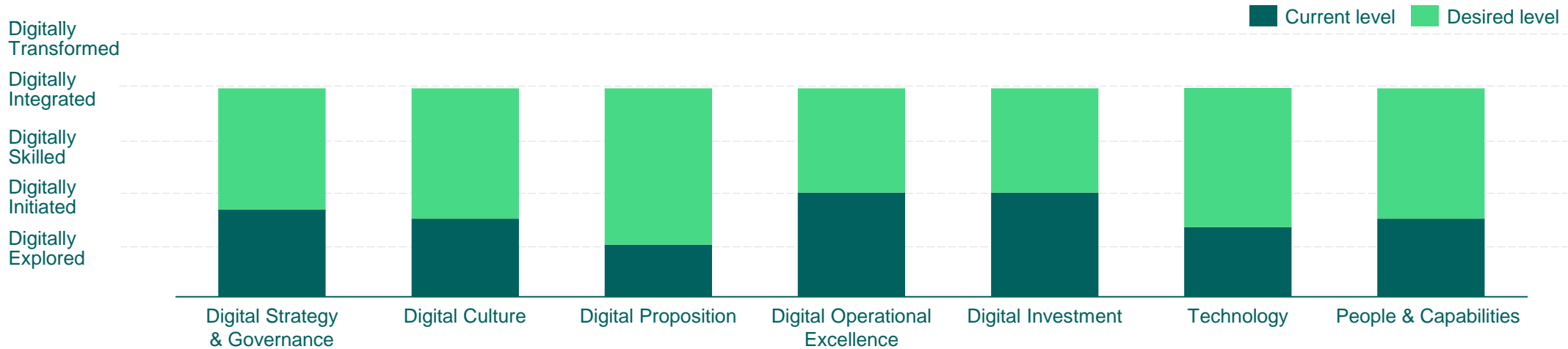
Inclusive consultation can result in enhanced reputation and competitiveness

Women's financial resilience is beneficial in household and community resilience and **fosters stable market and constant supply chains²**.

Increases the probability of attracting impact finance from investors with a gender focus



Digital Maturity Assessment (1/3) | Farmworks is digitally initiated and is currently focused on implementing a farmer management information system (FMS)



Results

The digital maturity assessment for Farmworks shows that the organization is digitally initiated:

- Overall, the leadership acknowledges the role that digital technologies play in enhancing operational experience and have several ad hoc initiatives in the planning which account for the potential impact and role of digital for the future.
- The company has, however, not fully leveraged the potential of digital service provision to farmers. The management is in the process of sourcing for an FMS to improve the efficiency of its service delivery to farmers.
- Farmworks leverages the QuickBooks system for its accounting. Paper (administration) still plays a part in processing farmer data (application, recruitment, input requirements and off-take).

Source: Farmworks interviews

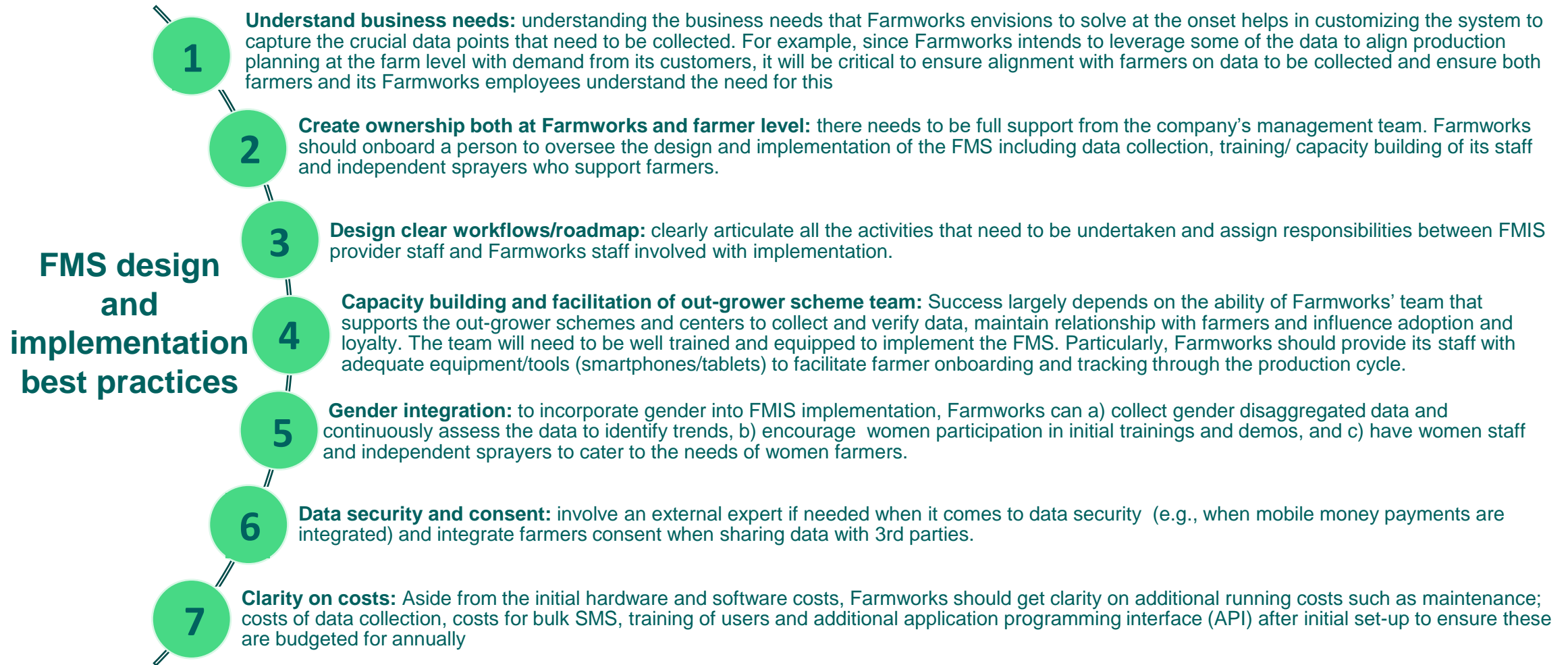
More information on the DTA methodology can be found [in the annex](#)

Recommendations

- Implement an FMIS to facilitate collection and management of farmer data to support efficient delivery of services and tailoring of services to the different farmer segments.
- Hire personnel to oversee the design and implementation of the FMIS including training/ capacity building of the relevant stakeholders.
- Ensure employees from all layers of the company are onboarded with the digital agenda (particularly on the FMIS), to avoid a lack of alignment.
- Document formal policies and rules that provide structure and guide quick decision making in the organization.
- Set aside an annual budget for digitization activities.



Digital Maturity Assessment (2/3) | Farmworks will need to consider best practices of implementation of an FMS in order to successfully and efficiently profile and manage their farmers.





Digital Maturity Assessment (3/3) | An understanding of the data and decision requirements will ensure adequate customization of the FMIS to cater to the needs of the business

	Farmer level	Farmworks level
Business needs	<ul style="list-style-type: none"> Streamline and make efficient farmer application and recruitment processes. Timely communicate with farmers (weather information, training tips etc.). Track production cycles/calendar and follow up of farm activity including automated agronomy support (production calendar, input use). Measure productivity of farmers Track credit history of farmers Track farmer attrition with an aim to increase farmer loyalty. Leverage data to inform tailoring of farmer services 	<ul style="list-style-type: none"> Understand farmer production cycles to ensure proper, adequate and timely input package supply Track on-farm crop performance through out the production cycle to anticipate supply and adequately and efficiently plan for collection, post-harvest management and transport to collection centers and packhouses. Track credit requirements and repayment of farmers to better manage farmer input loans and the business' working capital needs Ability to leverage the FMIS data to facilitate access to credit for farmers who qualify (e.g., with KCB bank and Juhudi Kilimo)
Data points	<ul style="list-style-type: none"> Farmer personal data Production data Farmer mobile details Service data (Type of services received) Farmer group details 	<ul style="list-style-type: none"> Farmer input package orders Farmer credit details (loan size, repayment period etc)
Potential risks	<ul style="list-style-type: none"> Reluctance of the farmers to share their data. Accuracy of the data provided/collected Low levels of digital literacy and mobile phone/mobile money account ownership. 	<ul style="list-style-type: none"> Ability to onboard people with the right digital skills. Potential resistance to change and lack of ownership by staff Inadequate capacity building support to staff. Limited budget dedicated to the digitization agenda. Need to ensure data security.



3

Business Case





For business sensitivity reasons, we have excluded the pages of 'Farmwork's business case' chapter from the report.



4

Impact Case



Farmer segments | Farmworks' farmers are segmented based on crop mix and mode of irrigation. Every SDM farmer has a baseline counterpart that does not receive any services from Farmworks.

Characteristics	Segment Nyeri			Segment Sagana			Segment Mwea		
	Baseline	SDM	SDM + drip	Baseline	SDM	SDM + drip	Baseline	SDM	SDM + drip
Crop portfolio	1. French Beans 2. Baby corn 3. Snow peas			1. French beans 2. Baby corn 3. Sweet potato			1. French beans 2. Sweet corn 3. Sweet potato		
#/plots/year ²⁾	Y1 = 2 Y5 = 5	Y1 = 2 Y5 = 5	Y1 = 2 Y5 = 5	Y1 = 2 Y5 = 5	Y1 = 2 Y5 = 5	Y1 = 2 Y5 = 5	Y1 = 2 Y5 = 5	Y1 = 2 Y5 = 5	Y1 = 2 Y5 = 5
Seasons per crop (& total)	1 (3)	1 (3)	1 (3)	1 (3)	1 (3)	1 (3)	1 (3)	1 (3)	1 (3)
Yield ¹⁾ (% index)	Y1 = -25% Y5 = -25%	Y1 = -25% Y5 = +30%	Y1 = 0% Y5 = +50%	Y1 = -25% Y5 = -25%	Y1 = -25% Y5 = +30%	Y1 = 0% Y5 = +50%	Y1 = -25% Y5 = -25%	Y1 = -25% Y5 = +30%	Y1 = 0% Y5 = +50%
Services									
Training	GAP Group Gov.		GAP Group Gov.	GAP Group Gov.		GAP Group Gov.	GAP Group Gov.		GAP Group Gov.
Inputs	Package		Package	Package		Package	Package		Package
Finance	Yes, 15%/Y		Year 15%/Y	Yes, 15%/Y		Year 15%/Y	Yes, 15%/Y		Year 15%/Y
Drip irrigation	No		Yes	No		Yes	No		Yes

Notes: 1) Yield (kg/acre) is different per crop and hence modelled with an index factor to arrive at the current and feasible yield; 2) A plot is an eighth of an acre and a farmer has a linear graduation from 2 to 5 plots per production cycle in 4 year.

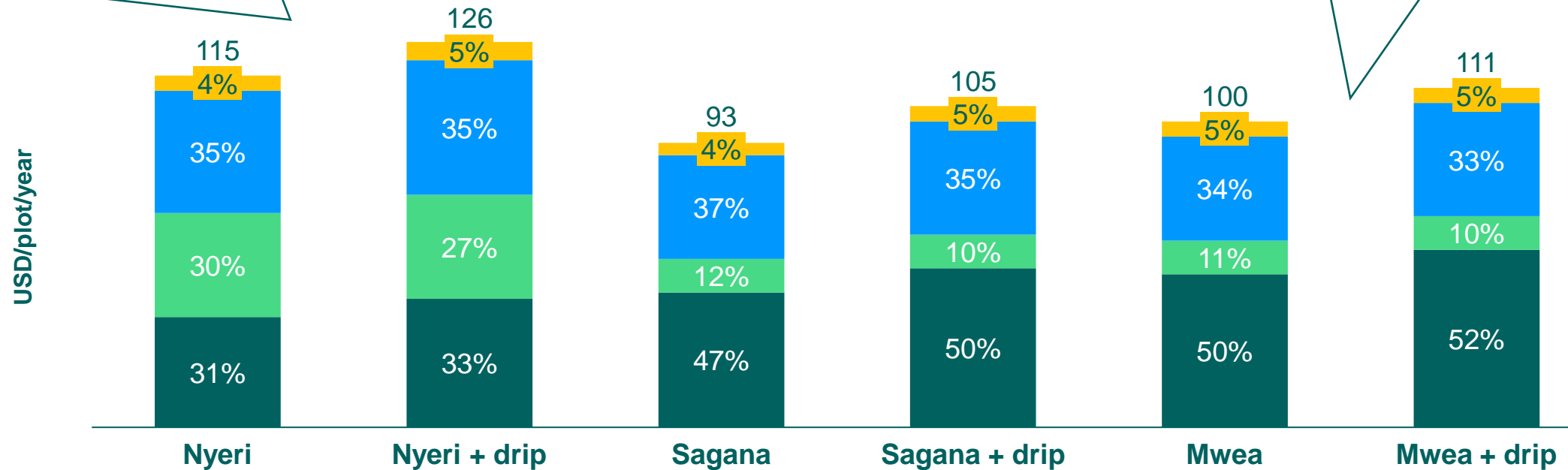


Service package cost | Service package cost differ due to the value of the inputs required to cultivate the specific vegetable portfolio mix grown per farmer segment.

Cost of service package five-year average (USD/plot/year)

Seeds Fertilizer Crop protection Interest

Farmers in Nyeri have a higher value input package compared to farmers in other regions due to cultivating snow peas which has a significantly higher cost of production resulting from higher crop protection costs compared to the other crops in the portfolio.

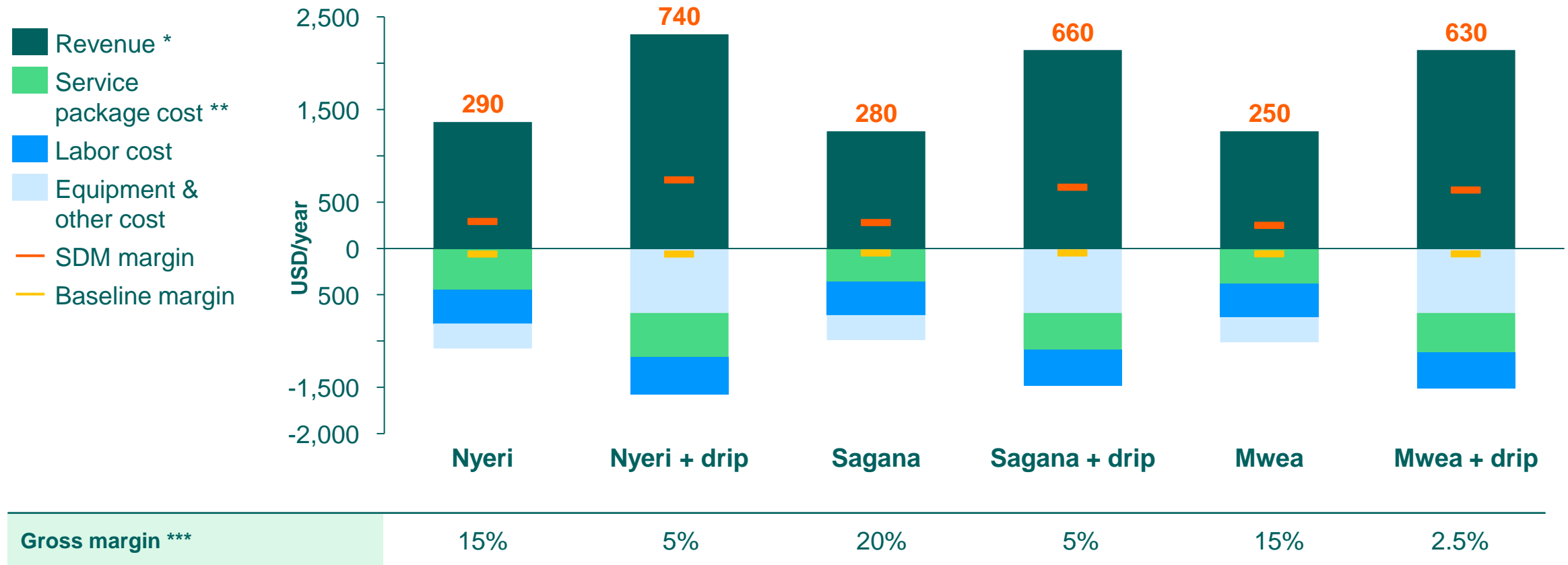


Notes: The number of crops cultivated per year is 3 based on the crop mix per region



Cost and profit | Unsurprisingly, farmers with drip irrigation achieve a higher average annual income compared to farmers without drip irrigation.

Cost of production and profit five-year average (USD/year)

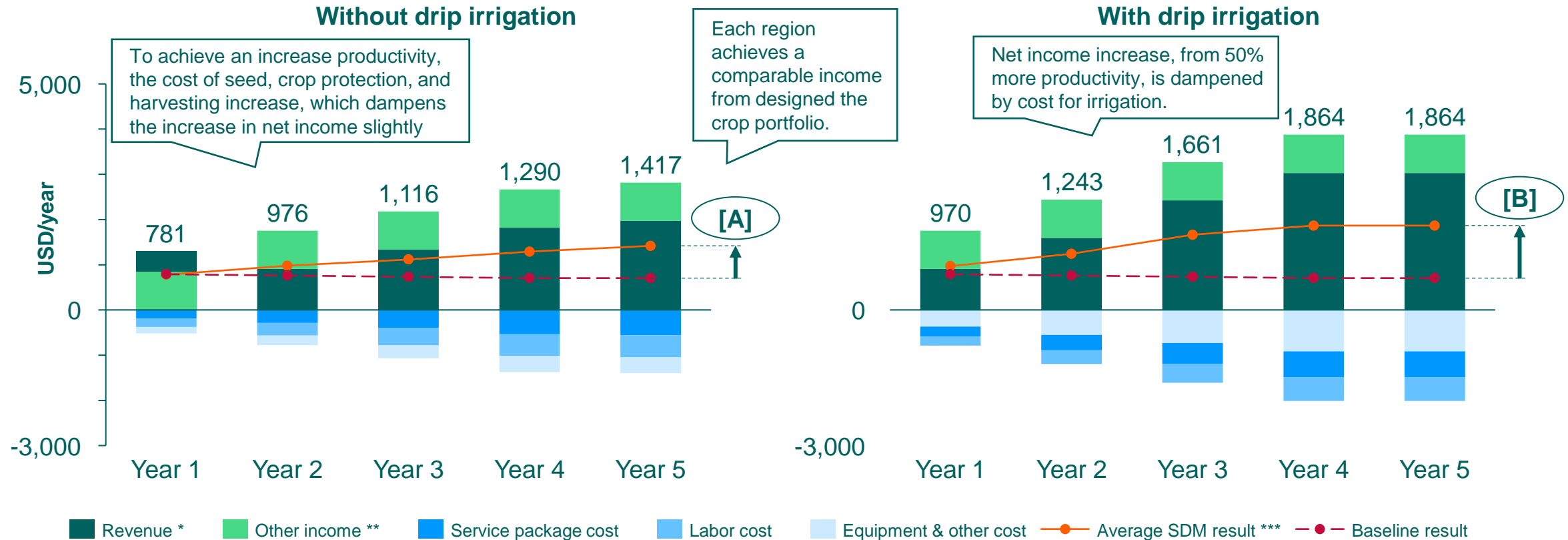


Notes: * Revenue from crop portfolio commodities; ** Service package cost is [shown in a breakdown here](#); *** Gross margin is equal to the margin from the focus crop portfolio divided by the revenue from the focus crop portfolio;



Farm P&L | Non-drip and drip farmers working with Farmworks achieve an income increase of **[A]** 50% (USD 376) and **[B]** 105% (USD 781) respectively, due to increased yields that outweigh the increase in costs.

Average profit and loss (for the 3 regions) for a five-year period (USD/year)

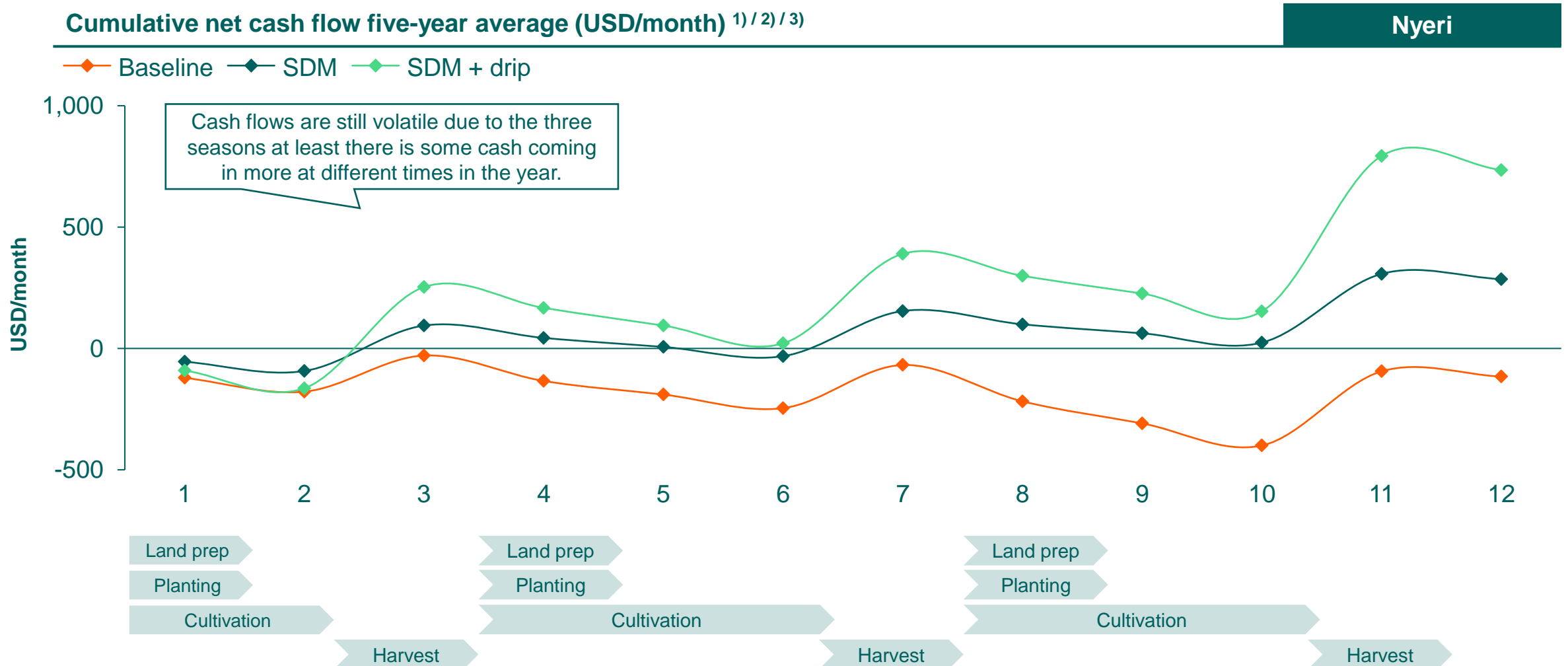


Notes: * Revenue from crop portfolio commodities; ** Other income consists of other crop income, livestock, and off farm income. With the increase of number of plots cultivated for Farmwork, the available land-size for other crops decreases. For this analysis, the other crop income remains constant and has not adjusted based on the re-allocation of land to Farmworks plots.

***Average SDM result refers to the average profit/loss from the performance in the 3 regions



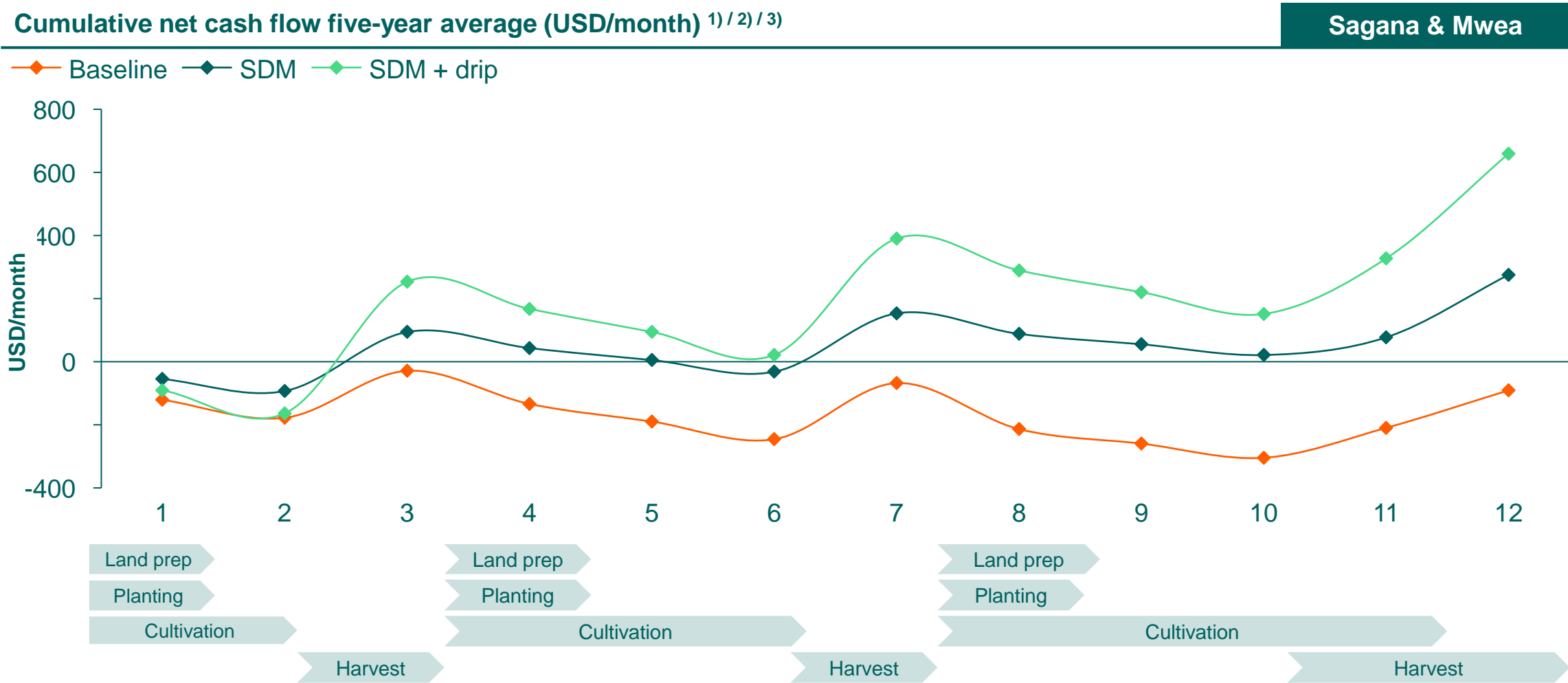
Monthly cash flow | The cashflow shows a three-wave trend matching the three cropping seasons for farmers who, with access to credit are able to attain positive cashflows most of the year



Notes: 1) Cash flow analysis only shows cash flows related to the SDM crop portfolio operations and excludes other income; 2) Numbers on x-axis indicate the sequence of month in which the crops are cultivated and are holistic to the calendar months; 3) Received input on credit is repaid during the harvest time.



Monthly cash flow | The cashflow shows a three-wave trend following the three cropping seasons for farmers who, with access to credit, are able to attain positive cashflows most of the year

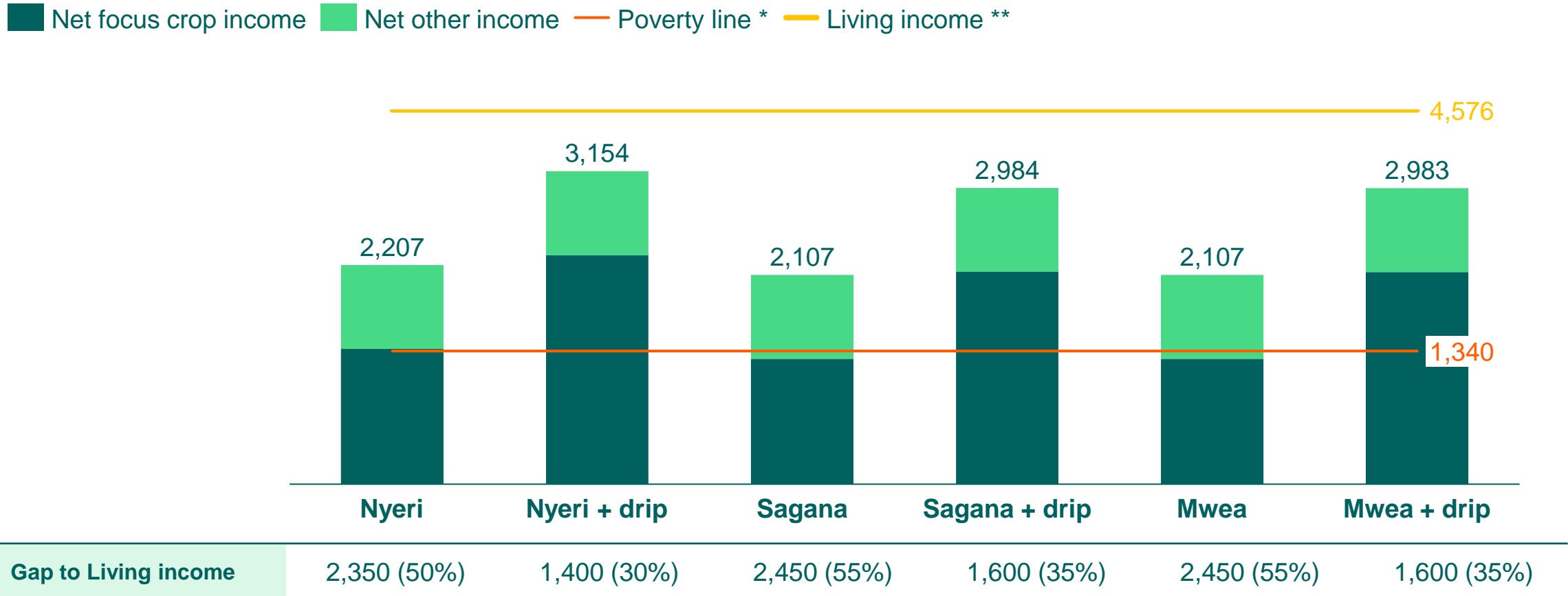


Notes: 1) Cash flow analysis only shows cash flows related to the SDM crop portfolio operations and excludes other income; 2) Numbers on x-axis indicate the sequence of month in which the crops are cultivated and are holistic to the calendar months; 3) Received input on credit is repaid during the harvest time.



Living income | With the increase in number of plots cultivated each year, farmers attain an income above the poverty line but significantly below the living income benchmark.

Household income, living income, poverty line comparison five-year average (USD/year)



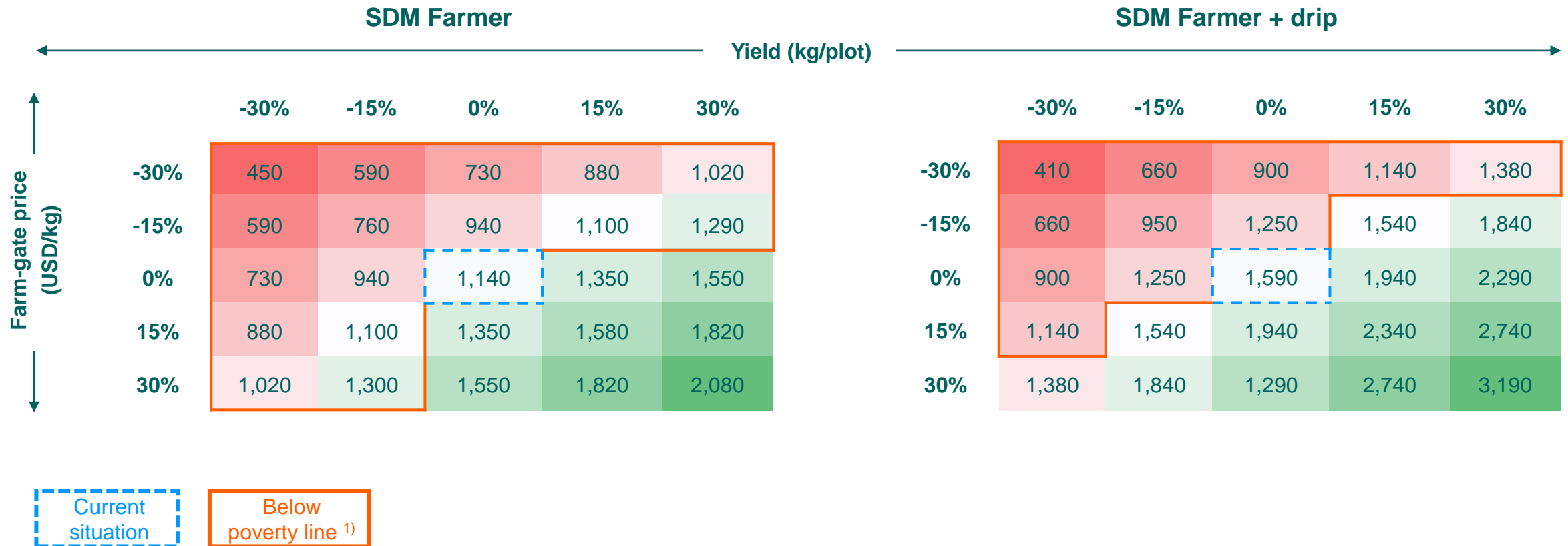
Notes: * The World Bank poverty line was adjusted to a household of 7 members. Further assumptions can be found [in the annex](#)

** The living income benchmark is based on a family composition of 2 adults and 5.7 children with 1.7 FTE. Further assumptions can be found [in the annex](#)



Sensitivity analysis | Farmer income is only slightly sensitive to changes in farm-gate price and yield, as total farmer income is predominantly composed of income from other sources outside of Farmworks' focus crops.

Sensitivity analysis on farmer income influenced by changes in yield and farm-gate price on five-year average (USD/year) ²⁾

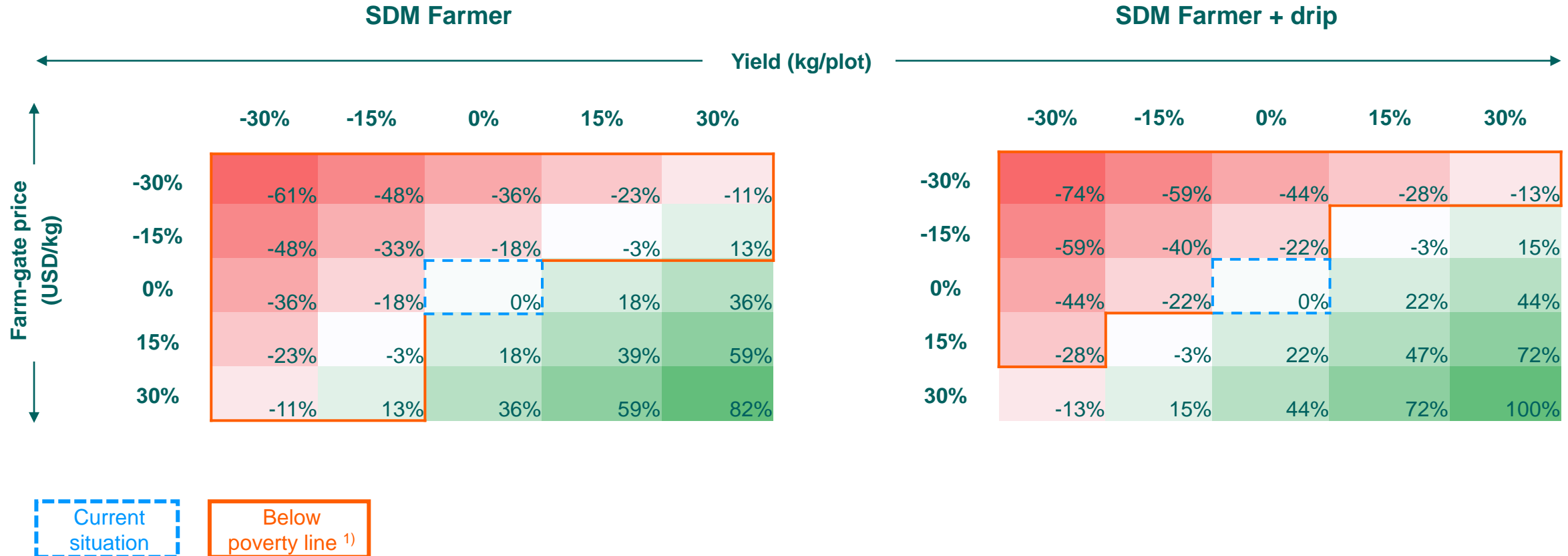


Notes: 1) The living income benchmark is based on a family composition of 2 adults and 5.7 children with 1.7 FTE at USD 1,340. Further assumptions can be found [in the annex](#); 2) The analysis is based on the 5-year average income of a Nyeri SDM (+ drip) farmer.



Sensitivity analysis | Farmers who cultivate with drip irrigation are more sensitive to changes in yield and price compared to farmers without drip irrigation (see [sensitivity analysis](#)).

Sensitivity analysis on farmer income influenced by changes in yield and farm-gate price on five-year average (USD/year) ²⁾



Notes: 1) The living income benchmark is based on a family composition of 2 adults and 5.7 children with 1.7 FTE at USD 1,340. Further assumptions can be found [in the annex](#); 2) The analysis is based on the 5-year average income of a Nyeri SDM (+ drip) farmer.

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IDH Annual Report 2021

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Thanks

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



Partners



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5

Annex



Abbreviations

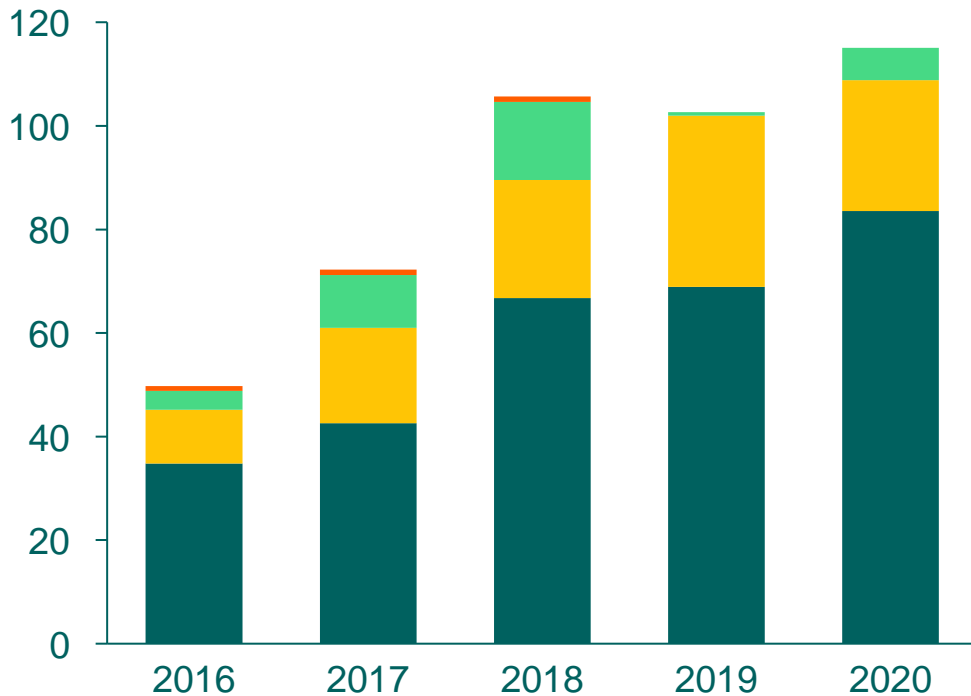
Abbreviation	Meaning
CBO	Community Based Organizations
COGS	Cost of Goods Sold
EBIT	Earnings Before Interest & Tax
FMIS	Farmer Management Information System
FPEAK	Fresh Produce Exporters Association of Kenya
FSP	Financial Service Providers
GAP	Good Agricultural Practices
KES	Kenyan shilling (currency)
MRL	Minimum Residue Levels
OG	Out-growers
P&L	Profit and loss statement
PHL	Post Harvest Losses
PU s	Production Units
SDM	Service delivery model
SHF	Smallholder farmer
TA	Technical Assistance
USD	United States dollar (currency)



Context | Production | Vegetable production has been increasing in Kenya and remains a key horticultural foreign exchange earner after floriculture.

Exotic Vegetable Production ('000 Tons) in Kenya from 2016 – 2020

■ Sweet corn ■ Baby corn ■ Snowpeas ■ French beans



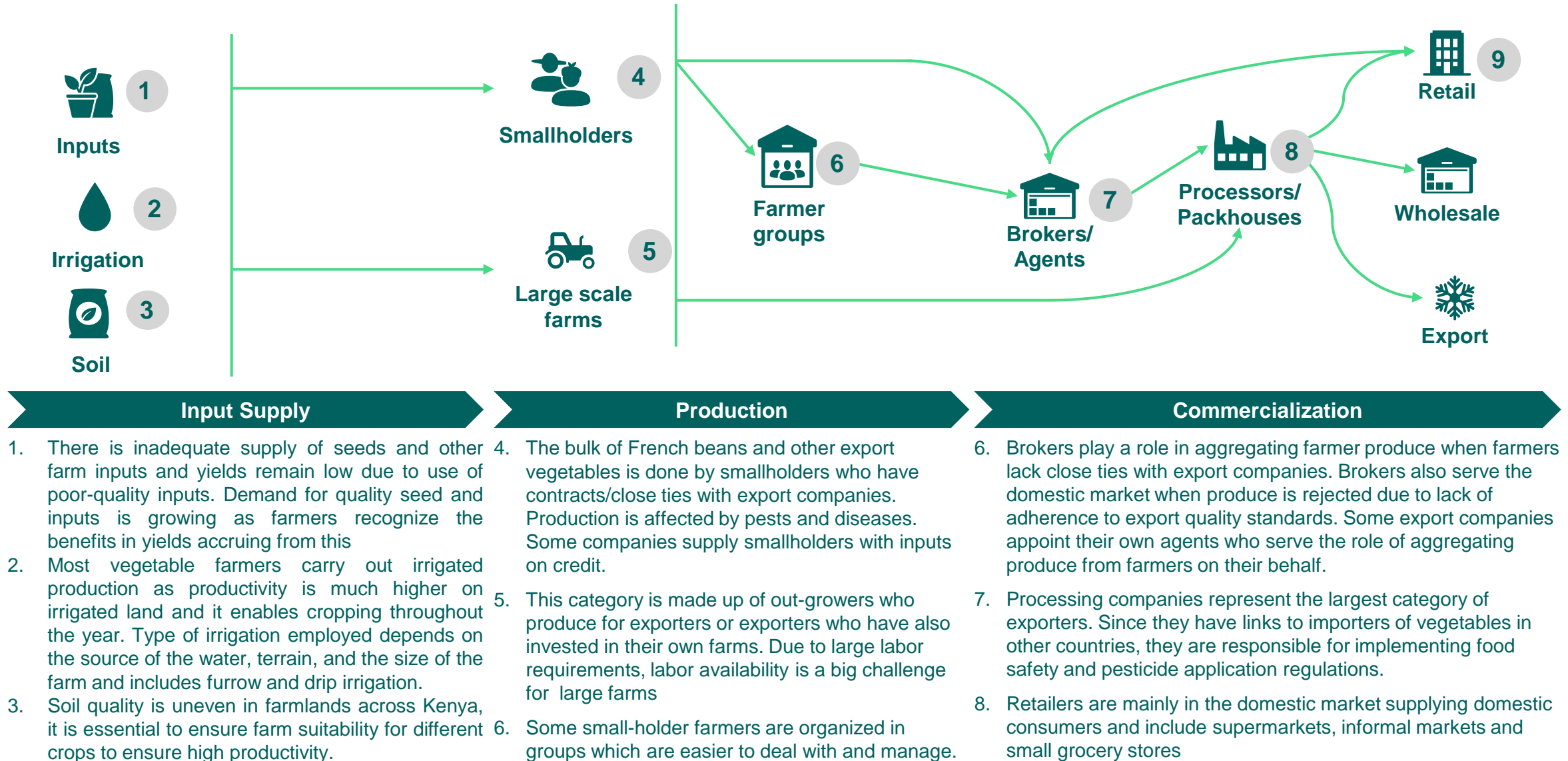
Sources: [HCDA Reports \(2019/2020, 2018/2019, 2017/2018\)](#)

Notes: e HCD data does not include production from large scale farms

- Kenya exported 62.6 tonnes of vegetables in 2020, a reduction from 72.7 million tons largely caused by COVID disruptions in the supply chain.
- Mixed vegetables, French beans and herbs accounted for the largest value of exported vegetable produce at 58%, 19.5% and 7%.
- Kenya produced 83,500 tons of French beans in 2020 on 8,200 hectares of land with Nakuru, Kajiado, Kirinyaga and Machakos accounting for 74% of total production. From this, 14,500 tons of value at KES 5 billion were exported in the same year.
- Despite the increase in production from 69,000 tonnes in 2019, production of French beans has continually been affected by pests and diseases. Some pests and diseases affecting production include aphids, bean rust and bean spot.
- While this can be controlled through use of pesticides, there have been increased reported cases of interception of consignments in the export markets due to exceedance of minimum residue levels (MRLs)
- Snow peas production was at 25,308 tons on 2,500 hectares of land. Meru, Nyandarua, Laikipia, Narok and Nyeri were the leading countries accounting for 98% of production. 2,000 tons were exported in 2020
- Kenya produced 6,215 tons of baby corn of which 112 tons was exported in 2020.
- Minimal volumes of sweet corn have been produced in the country and have largely been targeted for the export market.



Context | Value chain description | The value chain for export vegetables is largely made up of smallholder farmers contracted by export companies who supply farmers with inputs on credit





Context | Enabling Environment (1/3) | While advancements in technology allow for scaling and more efficient service delivery, significant investments are required in environment and infrastructure

		Opportunity	Neutral	Risk
Definition	Situation	Impact on SDM		
Technology	<ul style="list-style-type: none"> Mobile penetration: there were 59.24 million mobile connections in Kenya in 2021,¹ mobile money penetration stood at 73.8% in 2023.² Internet penetration is 28.5% in 2023, an increase of % from 2021.¹ Digital agricultural technologies (DATs): Kenya has about 113 institutions offering digital solutions for agriculture.³ 	<ul style="list-style-type: none"> Leveraging digital technology, internet and mobile penetration will allow for scaling and more efficient service delivery, communication on services on information regarding climate/weather and good agricultural practices. 		
Environment	<ul style="list-style-type: none"> Climate: Kenya's agricultural sector is heavily dependent on rainfall, which is becoming more irregular due to climate change. Irrigation: Only 7% of Kenyan agricultural land is irrigated creating while an estimated 36% of farms growing exotic vegetables is irrigated⁴ Regulatory environment: The sector is regulated by the Horticultural Crops Directorate (HCD), who are responsible for promoting the development of horticultural crops and licensing exporters among other roles. Other players include Ministry of Agriculture, Livestock and Fisheries, Kenya Plant Health Inspectorate Service and Pest Control Products Board. EU regulation requirements have been a big influence on the value chain.⁵ 	<ul style="list-style-type: none"> Farmers lacking irrigation infrastructure may suffer reduced incomes or crop losses which will result in lower rates of repeat customers. Regulatory compliance especially regarding Minimum Residue Levels (MRLs) is key to enter the EU market 		
Infrastructure	<ul style="list-style-type: none"> Road networks: Rural infrastructure is poor and farm accessibility is further hampered during rainy seasons. Poor road infrastructure leads to high PHLs.⁶ Handling & packaging: Vegetable handling practices depend on the market. Handling products destined for export and formal markets such as supermarkets is better developed and characterized by appropriate packaging, storage and cold-chain transportation. Informal traders use crude packaging, storage and transportation technologies which leads to product damages and food safety issues. PHL estimates for vegetables in Kenya ranged from 20% to 35%.⁶ 	<ul style="list-style-type: none"> PHLs have a disproportionate impact on the incomes of SHFs in rural areas where poverty levels are higher.⁶ Investment is required to improve efficiency regarding the farmer training on post-harvest handling, storage and cold chain infrastructure for this SDM. 		

1. [Digital 2021: Kenya](#) 2. [CA Kenya, 2023](#). 3. [Digital Agriculture Profile – Kenya](#). 4. [Irrigation strategies for vegetable SHFs](#) 5. [Green beans value chain in Kenya](#) 6. [PHLs in fruits and vegetables: The Kenyan context](#)



Context | Enabling Environment (2/3) | Demand for vegetable produce is expected to increase demand for seedlings thus improving the access and affordability of seedlings will be a critical intervention

Opportunity

Neutral

Risk

Definition	Situation	Impact on SDM
Labor	<ul style="list-style-type: none"> Labor availability: Rural-urban migration and the falling participation of population in agriculture has resulted to labor scarcity and high labor costs. Traditionally, most smallholders depend on family labor to carry out farming activities. The average age of a Kenyan farmer is 59 years which creates difficulties in executing some farm activities. Due to large labor requirements for optimum production, large scale farms have faced labor constraints.¹ 	<ul style="list-style-type: none"> High labor costs will result in reduced margins for farmers. For larger sized farmers who will need to rely on hired labor, labor unavailability may affect the quality of produce.
Inputs & Financing	<ul style="list-style-type: none"> Input financing: Smallholder farmers in Kenya use low levels of inputs due to lack of access to credit resulting in lower yields and low farm returns.² Financing: 37.5% of rural population borrowed money from a formal financial institution or uses mobile money.³ 	<ul style="list-style-type: none"> Inadequate financing limits farmer productivity and impact.
Pricing & Competition	<ul style="list-style-type: none"> Seed pricing: Price of seedlings is one of the highest costs for farmers and is a big determinant of productivity. Produce supply: Market glut and perishability results in lower prices and wastage at the farm level during high production seasons and vice versa. Produce pricing: Farmers have decried low farmgate prices for vegetable produce against rising costs of production with middlemen absorbing much of the value within the chain.⁴ 	<ul style="list-style-type: none"> High seed and input costs may act as a disincentive for farmers to invest in horticulture thus improving access and affordability will be a critical intervention. Low prices create disincentivizes investment in production. This creates an opportunity for the SDM operator to tighten the value chain creating value for both the farmer and business.
Trading System	<ul style="list-style-type: none"> Kenya is a member of the Eastern African Community (EAC) and COMESA trading blocks, with substantial cross border trade with Uganda and Tanzania. Kenya is also one of the key exporters of fresh vegetables to the European Union with 62,500 tons exported in year 2020.⁴ 	<ul style="list-style-type: none"> Trading blocs provide a market for produce, whether directly or indirectly through aggregators.

1. [Green beans value chain in Kenya](#) 2. [Kenya Markets Trust, 2019](#) 3. [World Bank, 2021](#) 4. [HCDA Report 2019/2020](#)



Context | Enabling Environment (2/3) | Gender concerns at both land ownership and production create opportunities to increase women involvement in the value chain

		Opportunity	Neutral	Risk
Definition	Situation	Impact on SDM		
Institutional Stability	<ul style="list-style-type: none"> Regulatory responsibilities: While the vegetable sector is more developed than other sectors, there exists confusion with regards to regulatory responsibilities of KEPHIS, HCD, counties and other related associations.¹ Regulatory Implementation: Where roles are clear, implementation is infrequent and sometimes non-existent. Some institutions such FPEAK, and KALRO however continue to support farming through sector organization and coordinated research efforts.¹ 	<ul style="list-style-type: none"> Institutional stability is critical for creating a predictable environment that spurs value chain investment. 		
Land Tenure	<ul style="list-style-type: none"> Ownership: Cultural norms still underpin ownership of land with men observed to own land more than women across most of the country. <5% of title deeds are owned by women.⁵ 	<ul style="list-style-type: none"> To increase participation of women as farmers in the SDM, there is a need to get buy in from the men. 		
Social Norms	<ul style="list-style-type: none"> Gender on farm: While women are instrumental in the provision of farm labor, their decision making is limited.¹ 	<ul style="list-style-type: none"> There is need for deliberate efforts to include women in the SDM for maximum impact. 		

1. [Horticultural Seedlings Nursery Survey Report](#) 5. [Federation of Women Lawyers Kenya](#)



Learning questions (1/2)

With this SDM analysis, we aim to answer the following questions:

Topic	Question	Answered
Service coalition	<ul style="list-style-type: none">• What are success factors to the service coalition for input provision (and training of farmers)?• To what extent does the coalition for input provision increase sourcing volumes (and reduce servicing costs) for Farmworks?	<ul style="list-style-type: none">• Input impact on farm-level in Impact case
Apprenticeship scheme	<ul style="list-style-type: none">• How does the apprenticeship work and success factors for implementation?• What are (potential) spillover effects of the apprenticeship scheme in the sector?	<ul style="list-style-type: none">• Training impact on farm-level in Impact case• To be evaluated during TA
Drip irrigation investment scheme	<ul style="list-style-type: none">• What are success factors to farmers transitioning/uptake of irrigation technologies	<ul style="list-style-type: none">• Irrigation impact on farm-level in Impact case• To be evaluated during TA
Contract Farming (pre-season prices or market price)	<ul style="list-style-type: none">• How do different contract modalities (fixed price, price agreement 2 weeks before harvest or market price) differ in farmers uptake?• To what extent do market contracts reduce sideselling?	<ul style="list-style-type: none">• Pricing, loyalty, default evaluated in Impact / Business case• To be evaluated during TA



Learning questions (2/2)

With this SDM analysis, we aim to answer the following questions:

Topic	Question	Answered
Collection Centres & Spraying units	<ul style="list-style-type: none">• What are success factors to the functioning and scaling of collection centres with independent sprayers?• How does the CPU structure with independent sprayers affect cost of production for farmers?• How do the CC network and CPU create efficiency (in servicing/sourcing)?	<ul style="list-style-type: none">• Performance projected in Business case• To be evaluated during TA
FMIS & Digital payment system	<ul style="list-style-type: none">• What are success factors for digital payment?• How and to what extent does FMIS improve traceability and reduce aggregation cost?	<ul style="list-style-type: none">• To be evaluated during TA
Farmer Field Schools (FFS)	<ul style="list-style-type: none">• What are success factors in training farmers (m/f) via FFS and agents (visitation, mentorship demo farms)• How do FFS and training via agents (visitation, mentorship, demos) differ in farmers reached and conditions for scaling?• What is the role of FFS (vs training via agents/non-participatory approach) in changing farmers practices and use of inputs?	<ul style="list-style-type: none">• To be evaluated during TA
Service packages	<ul style="list-style-type: none">• How can Farmworks (expand the service coalition to) improve farmer access to organic fertilizers?	<ul style="list-style-type: none">• To be evaluated during TA



SDM operator assumptions

For business sensitivity reasons, we have excluded the pages of 'Farmwork's assumptions from the report.

Farmer assumptions (1/7)



1. REVENUES

Farm size

Total farmer land size	#/acres
Size Dedicated to Horticulture production	#/acres
Size dedicated to other crop	#/acres

Adjusted for new analysis on farm-level only

Number of plots

Year 1	#/plots
Year 2	#/plots
Year 3	#/plots
Year 4	#/plots
Year 5	#/plots

Crop portfolio

French beans	Yes/no
Baby corn	Yes/no
Sweet corn	Yes/no
Snow peas	Yes/no
Sweet potato	Yes/no

Number of seasons

Seasons per commodity per year	# of seasons
--------------------------------	--------------

Zone 1 - Nyeri			Zone 2 - Sagana			Zone 3 - Mwea		
Baseline Zone 1 - Single Plot	SDM Zone 1 - Single Plot	SDM Zone 1 - Drip Plot	Baseline Zone 2 - Single Plot	SDM Zone 2 - Single Plot	SDM Zone 2 - Drip Plot	Baseline Zone 3 - Single Plot	SDM Zone 3 - Single Plot	SDM Zone 3 - Drip Plot

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Current Yield (Kgs/Plot)

Sales price (KES/kg)

250	See SDM operator assumptions
400	
400	
200	
600	

Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
No	No	No	No	No	No	Yes	Yes	Yes
Yes	Yes	Yes	No	No	No	No	No	No
No	No	No	Yes	Yes	Yes	Yes	Yes	Yes

1	1	1	1	1	1	1	1	1
---	---	---	---	---	---	---	---	---

Farmer assumptions (2/7)



1. REVENUES

Crop performance

Year 1	% index of current
Year 2	% index of current
Year 3	% index of current
Year 4	% index of current
Year 5	% index of current

Loyalty to Farmworks

Sales of marketable surplus to Farmworks	%/volume/year
--	---------------

Other income

Other crop income	KES/year
Livestock income	KES/year
Off farm labor income	KES/year
Off farm non-labor income	KES/year

Zone 1 - Nyeri			Zone 2 - Sagana			Zone 3 - Mwea		
Baseline Zone 1 - Single Plot	SDM Zone 1 - Single Plot	SDM Zone 1 - Drip Plot	Baseline Zone 2 - Single Plot	SDM Zone 2 - Single Plot	SDM Zone 2 - Drip Plot	Baseline Zone 3 - Single Plot	SDM Zone 3 - Single Plot	SDM Zone 3 - Drip Plot

-25%	-25%	50%	-25%	-25%	50%	-25%	-25%	50%
-25%	0%	75%	-25%	0%	75%	-25%	0%	75%
-25%	10%	100%	-25%	10%	100%	-25%	10%	100%
-25%	20%	100%	-25%	20%	100%	-25%	20%	100%
-25%	30%	100%	-25%	30%	100%	-25%	30%	100%

0%	95%	95%	0%	95%	95%	0%	95%	95%
----	-----	-----	----	-----	-----	----	-----	-----

60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500
5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000

Farmer assumptions (3/7)



2. EXPENSES	Zone 1 - Nyeri			Zone 2 - Sagana			Zone 3 - Mwea		
	Baseline Zone 1 - Single Plot	SDM Zone 1 - Single Plot	SDM Zone 1 - Drip Plot	Baseline Zone 2 - Single Plot	SDM Zone 2 - Single Plot	SDM Zone 2 - Drip Plot	Baseline Zone 3 - Single Plot	SDM Zone 3 - Single Plot	SDM Zone 3 - Drip Plot

2.1 Labor

Hired labor		KES/day	Beans
Land Prep	#/days/plot	300	1.0
Planting	#/days/plot	300	1.0
Weeding	#/days/plot	300	2.0
Irrigating	#/days/plot	300	2.0
Fertilizer application	#/days/plot	300	1.0

Harvesting & Delivery	#/days/plot	300	8.3
-----------------------	-------------	-----	-----

Year 1	% index of current	0%	0%	10%	0%	0%	10%	0%	0%	10%
Year 2	% index of current	0%	0%	20%	0%	0%	20%	0%	0%	20%
Year 3	% index of current	0%	5%	30%	0%	5%	30%	0%	5%	30%
Year 4	% index of current	0%	10%	30%	0%	10%	30%	0%	10%	30%
Year 5	% index of current	0%	10%	30%	0%	10%	30%	0%	10%	30%

Farmer assumptions (4/7)



			Zone 1 - Nyeri			Zone 2 - Sagana			Zone 3 - Mwea		
			Baseline Zone 1 - Single Plot	SDM Zone 1 - Single Plot	SDM Zone 1 - Drip Plot	Baseline Zone 2 - Single Plot	SDM Zone 2 - Single Plot	SDM Zone 2 - Drip Plot	Baseline Zone 3 - Single Plot	SDM Zone 3 - Single Plot	SDM Zone 3 - Drip Plot
2. EXPENSES (Cont.)											
2.2 Inputs											
Seeds, spray & fertilizer											
French beans	KES/Plot	See SDM Operator assumptions									
Baby corn	KES/Plot										
Sweet corn	KES/Plot										
Snow peas	KES/Plot										
Sweet potato	KES/Plot										
Seeds											
Year 1	% index of current		0%	0%	30%	0%	0%	30%	0%	0%	30%
Year 2	% index of current		0%	0%	30%	0%	0%	30%	0%	0%	30%
Year 3	% index of current		0%	10%	30%	0%	10%	30%	0%	10%	30%
Year 4	% index of current		0%	20%	30%	0%	20%	30%	0%	20%	30%
Year 5	% index of current		0%	30%	30%	0%	30%	30%	0%	30%	30%
Spray											
Year 1	% index of current		0%	0%	0%	0%	0%	0%	0%	0%	0%
Year 2	% index of current		0%	0%	0%	0%	0%	0%	0%	0%	0%
Year 3	% index of current		0%	0%	0%	0%	0%	0%	0%	0%	0%
Year 4	% index of current		0%	0%	0%	0%	0%	0%	0%	0%	0%
Year 5	% index of current		0%	0%	0%	0%	0%	0%	0%	0%	0%
Fertiliser											
Year 1	% index of current		0%	0%	10%	0%	0%	10%	0%	0%	10%
Year 2	% index of current		0%	0%	15%	0%	0%	15%	0%	0%	15%
Year 3	% index of current		0%	0%	15%	0%	0%	15%	0%	0%	15%
Year 4	% index of current		0%	5%	15%	0%	10%	15%	0%	10%	15%
Year 5	% index of current		0%	10%	15%	0%	10%	15%	0%	10%	15%

Farmer assumptions (5/7)



2. EXPENSES (Cont.)

Equipment & Other

Equipment types		KES/unit	Lifespan (yrs)									
				Zone 1 - Nyeri			Zone 2 - Sagana			Zone 3 - Mwea		
				Baseline Zone 1 - Single Plot	SDM Zone 1 - Single Plot	SDM Zone 1 - Drip Plot	Baseline Zone 2 - Single Plot	SDM Zone 2 - Single Plot	SDM Zone 2 - Drip Plot	Baseline Zone 3 - Single Plot	SDM Zone 3 - Single Plot	SDM Zone 3 - Drip Plot
Non mechanic equipment	#/farm	0	0	1	1	1	1	1	1	1	1	1
Mechanic equipment	#/farm	0	0	1	1	1	1	1	1	1	1	1
Other equipment	#/kg/bag	0	0	1	1	1	1	1	1	1	1	1
Drip irrigation	#/plot	50,000	3.5	1	1	1	1	1	1	1	1	1
Year 1	use/drip irrigation			0	0	1	0	0	1	0	0	1
Year 2	use/drip irrigation			0	0	1	0	0	1	0	0	1
Year 3	use/drip irrigation			0	0	1	0	0	1	0	0	1
Year 4	use/drip irrigation			0	0	1	0	0	1	0	0	1
Year 5	use/drip irrigation			0	0	1	0	0	1	0	0	1

Finance cost

Credit principle / duration

Amount due	Access to credit	# months/season
French beans	KES/plot	3
Baby corn	KES/plot	4
Sweet corn	KES/plot	4
Snow peas	KES/plot	4
Sweet potato	KES/plot	5

Credit terms

Annual interest rate	%/year	15.0%
Monthly interest rate	%/year	1.3%



Farmer assumptions (6/7)

3. LIVING INCOME

Living income benchmark

		USD	KES
Benchmark	/year	4,843	581,184

Poverty line

		USD	KES
Benchmark	/year	1,418	170,160

4. MONTHLY ACTIVITIES

French beans

		1	2	3	4	5	6	7	8	9	10	11	12
Land preparation	%/activity/month	100%											
Planting	%/activity/month	100%											
Cultivating	%/activity/month	33%	33%	33%									
Harvesting	%/activity/month			100%									
Marketing	%/activity/month			100%									
Access to input on credit	%/activity/month			100%									

Baby corn

		1	2	3	4	5	6	7	8	9	10	11	12
Land preparation	%/activity/month				100%								
Planting	%/activity/month				100%								
Cultivating	%/activity/month				33%	33%	33%						
Harvesting	%/activity/month							100%					
Marketing	%/activity/month							100%					
Access to input on credit	%/activity/month							100%					



Farmer assumptions (7/7)

4. MONTHLY ACTIVITIES

Sweet corn

Land preparation	%/activity/month
Planting	%/activity/month
Cultivating	%/activity/month
Harvesting	%/activity/month
Marketing	%/activity/month
Access to input on credit	%/activity/month

1	2	3	4	5	6	7	8	9	10	11	12
			100%								
			100%								
			33%	33%	33%						
						100%					
						100%					
						100%					

Snow peas

Land preparation	%/activity/month
Planting	%/activity/month
Cultivating	%/activity/month
Harvesting	%/activity/month
Marketing	%/activity/month
Access to input on credit	%/activity/month

1	2	3	4	5	6	7	8	9	10	11	12
							100%				
							100%				
							33%	33%	33%		
										100%	
										100%	
										100%	

Sweet potatoes

Land preparation	%/activity/month
Planting	%/activity/month
Cultivating	%/activity/month
Harvesting	%/activity/month
Marketing	%/activity/month
Access to input on credit	%/activity/month

							100%				
							100%				
							25%	25%	25%	25%	
										50%	50%
										50%	50%
										50%	50%

General

Other expense	%/activity/month
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1	2	3	4	5	6	7	8	9	10	11	12
8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%