



Mwea Rice Growers Multipurpose

Public Case Report
August 2020

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Introducing Service Delivery Models (SDM)

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



Introducing Mwea Rice Growers Multipurpose Cooperative (MRGM)



- Since 1964, Mwea farmers co-operative society for farmers under Mwea irrigation scheme has been in existence in various forms. From then onwards, the society has undergone numerous changes in its journey towards current form that came into existence in 1999.
- Currently, Mwea Rice Growers Multipurpose Co-operative Society Ltd (MRGM) earns the bulk of its income from rice marketing. The Society is involved in the entire rice value chain from crop production, to processing and marketing.
- The Society has a total of 6,500 registered members with a varying number (approximately 2,000–2,500) of them being active each year.
- MRGM is run by a board of directors of nine members and three supervisory committee members elected by members at the Annual General Meeting. The directors retire on a rotational basis following a three-year renewable term. The day to day operations of the Society are run by the professional management team.
- MRGM provides various services along the value chain to farmers including land preparation, rotavating, disk ploughing, levelling, seeds, transplanting, farm inputs, harvesting and transport of the paddy to the mill. These services are provided on credit. Members can also access cash advances which are taken into consideration to ensure the total member exposure does not exceed 70% of the paddy delivered



Executive summary

- MRGM is a paddy farmers cooperative operating mainly under Mwea irrigation scheme in Kiriyaanga county of Kenya. The society is run by a professional management team. MRGM's primary activities include providing services and input on credit to smallholder basmati rice farmers who in turn sell their produce to MRGM.
- MRGM targets to scale up their operations to gain 30% market share in Mwea paddy trade by 2023 (translates to 300,000 paddy bags) from current market share of about 10% (c.60,000 bags). This will positively impact paddy farmers in the Mwea irrigation scheme that can benefit from MRGM's services and much better farm-gate price for their paddy.
- MRGM operations have been impacted by the COVID-19 crisis particularly the sales of white rice through both retail and bulk channels because of continuing lockdown in urban areas. On a positive note, the Government of Kenya has been buying paddy from farmers through MRGM at KES 85/kg which has been a shot in the arm for MRGM paddy procurement operations.
- Over the recent years, MRGM has been finding it a challenge to grow their active farmer base, increase farmer loyalty and reach their target market share of [30% of Mwea paddy trade](#). In order to achieve their market share target in a sustainable and cost-efficient way, they must address critical bottlenecks of delayed payments for paddy purchase to farmers and inadequate capacity to meet field services demand.
- This study demonstrates that MRGM can meet their stated objective by (1) improving farmer loyalty; (2) moving up the rice value chain by investing in premium brands; and (3) strategically diversifying and streamlining operations.
- Farmer loyalty can be significantly improved by increasing impact at farm-level. Impact at farm can be increased by:
 - Making cash payment for paddy purchased from farmers
 - Targeted fertilizer blends and practicing crop rotation will result in higher farm productivity
 - Building a network of lead farmers can bring in more active farmers
 - Providing post-harvest services can ameliorate poor infrastructure
- Stable demand can be secured by moving up the value chain. To effect this, we suggest the following actions:
 - Leverage government buying in 2020 to gain market share
 - Strengthen retail channel by investing in premium brands
- Strategically diversify and streamline operations to bolster MRGM's financial sustainability. The following options are explored:
 - Enable farmers to bank with finance institutions which can ease the pressure on MRGM balance sheet
 - Diversify operations into crops synergistic to paddy
 - Streamline non-core support businesses to prioritize capital availability for core operations

Context

Understanding the paddy market in Kenya and role of Mwea irrigation scheme

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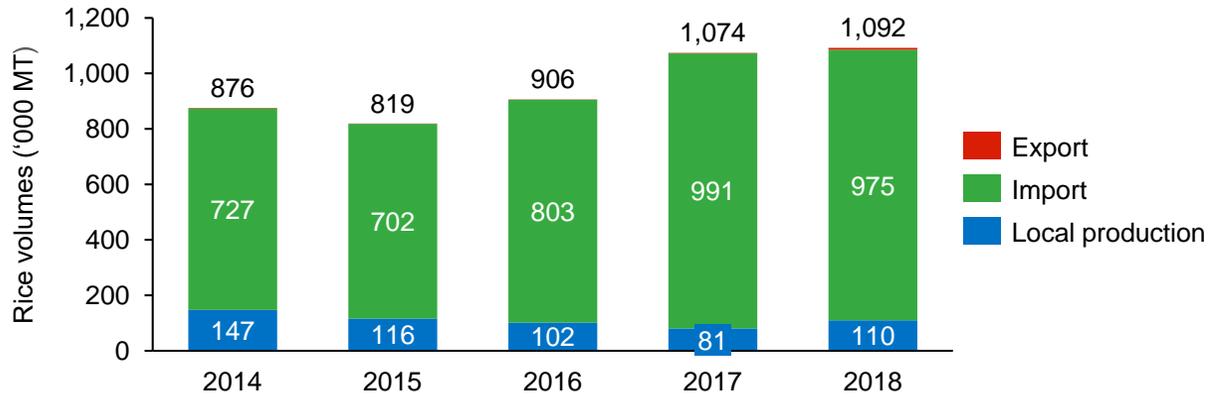
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Market

Domestic demand outstrips supply, forcing Kenya to import over 80% of its rice consumption

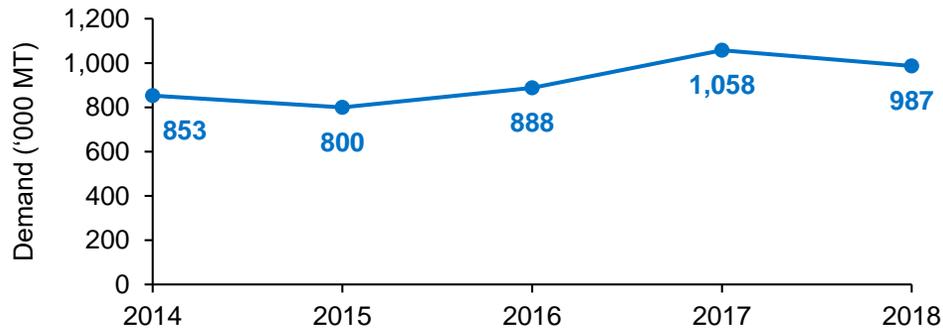
Kenya's rice production remains low

Total rice production, import and exports volumes¹



Kenya's rice consumption is set to increase into the future

Domestic rice consumption (food only)¹



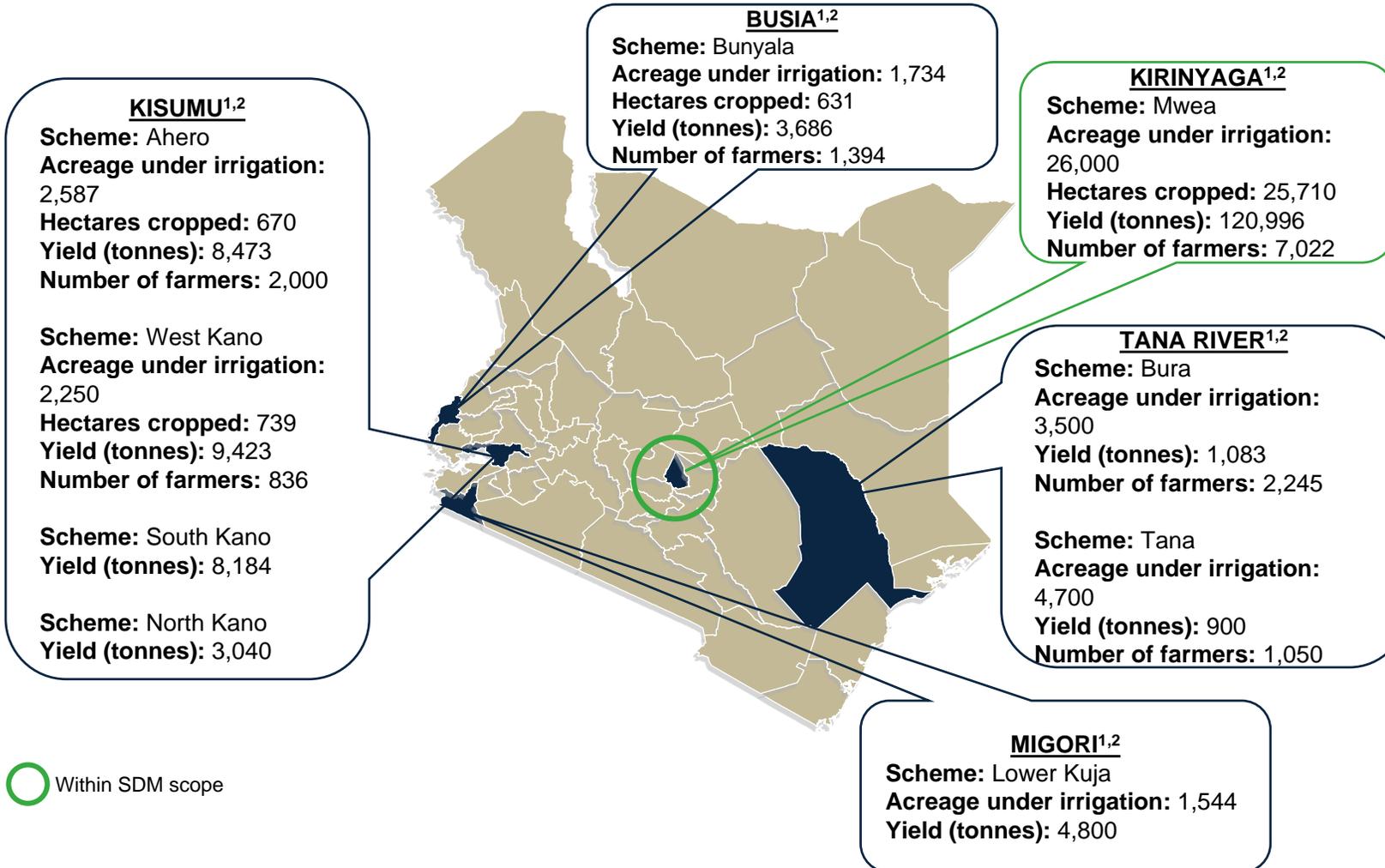
Demand outstrips supply

- Rice is the third most consumed cereal crop in Kenya after maize and wheat. Due to the progressive change in eating habits of Kenyans, the annual consumption of rice is increasing at a rate of 12%².
- National rice consumption is currently estimated at 949,000 metric tonnes (MT). This is projected to increase to 1.29 million MT by 2030².
- The country's rice deficit is met through imports which were valued at KES c.26 billion in 2018³.
- Rice imports are mainly sourced from Pakistan (c.74%), Vietnam (c.7%), Thailand (c.4%) and India (c.4%). There are also minimal imports from neighbouring East Africa Community countries⁴.
- Locally produced rice is of higher quality compared to imported rice. Bulk of the rice produced in Kenya is of basmati variety⁵.
- Rice consumers in the country prefer the aromatic basmati rice which has superior cooking qualities in comparison to other local and imported varieties⁵.
- The country has been grappling with incidences of adulteration of the local high-quality rice with cheaper rice imports which are fraudulently repackaged and brought to the market. This practice presents unfair competition to the locally produced rice⁵.
- Technology adoption has a huge potential in promoting rice production. Low adoption of agricultural technologies has been associated with gender related issues. Women hardly attend seminars or training workshops, yet they are the central players in rice production. This is likely to have adverse effects on adoption and up scaling of rice technologies. Deliberate targeting of women and children for capacity building and technology transfer will enhance production and productivity⁵.

Sources: ¹KNBS – Enhanced Food Balance Sheet for Kenya 2104 – 2018 Results, ²International Rice Research Institute, ³KNBS – Statistical Abstract 2019, ⁴MAFAP - Analysis Of Incentives and Disincentives for Rice in Kenya, ⁵Ministry of Agriculture – National Rice Development Strategy (2008 – 2018)

Farmer base

Mwea irrigation scheme accounts for over 70% of the country's rice production

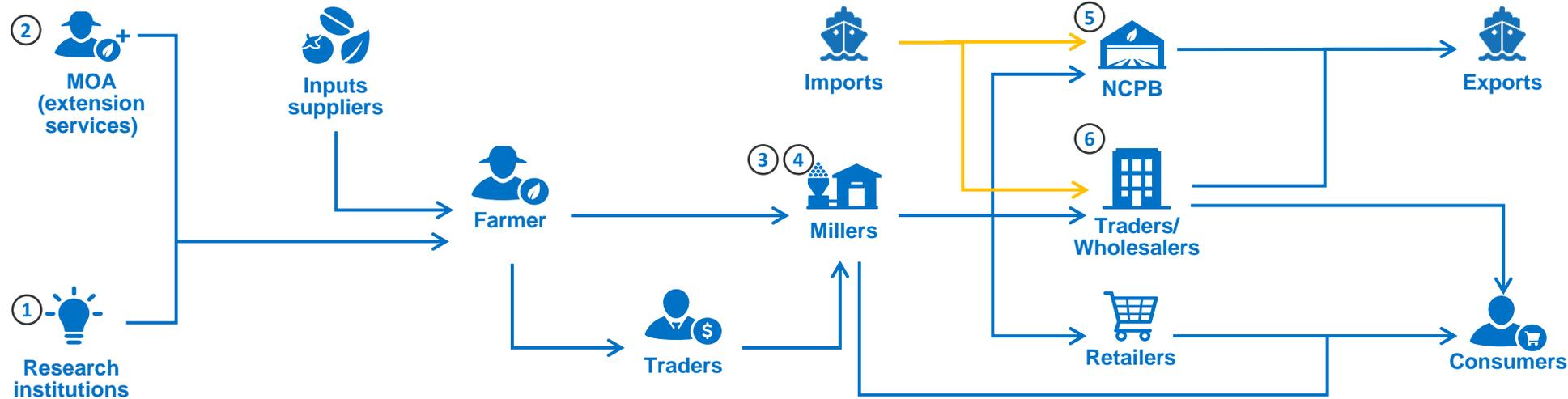


- In Kenya rice is mainly produced by small-scale farmers in Central (Mwea), Western (Bunyala), Coast (Tana delta, Msambweni) and Nyanza provinces (Ahero, West Kano, Migori and Kuria)³.
- About 90% of the rice grown in Kenya is from irrigation schemes established by the Government while the remaining 10% is produced under rainfed conditions⁴.
- About 300,000 rice farmers provide labour and also earn their livelihood out of the crop's production².
- The total land area under rice production was estimated at 32,277 hectares in 2019². The Government of Kenya is working towards increasing this to 104,000 hectares by 2030 with a view to attain rice self sufficiency⁴.
- Measures undertaken by the Government to achieve the rice self sufficiency target include expanding the Mwea irrigation scheme.
- The Mwea irrigation scheme is the largest in the country. There is potential to increase this scheme by a further 10,000 acres. However, this is constrained by lack of sufficient water¹.
- Of the total rice farmers in the Mwea scheme, 2,140 farmers are active members of MRGM. Further, the total volume of rice paddy handled by MRGM is just 10% of the total production from the scheme.

Sources: ¹National Irrigation authority, ²KNBS – Economic Survey 2020, ³Ministry of Agriculture – National Rice Development Strategy (2008 – 2018), ⁴Ministry of Agriculture – Rice Promotion and Production in Kenya, Map: <https://yourfreetemplates.com/free-kenya-editable-map/>

Rice value chain

Capacity building of stakeholders within the value chain on rice production, processing and marketing has potential to boost the country's rice production



Research and extension

1. Research institutions such as Kenya Agricultural and Livestock Research Organisation (KALRO) coordinate research efforts and promote application of findings within the agricultural field. Based on research, seed producers, under supervision of Kenya Plant Health Inspectorate Service (KEPHIS), produce certified seed.
2. Following identification of rice as a strategic crop for food security in the country, the Kenyan Government, through the Ministry of Agriculture (MOA), provides extension services with a view to promote local rice production.

Millers

3. There are four major rice mills spread across the country: Kibos rice mills (subsidiary of Lake Basin Development Authority - LBDA), Mwea rice mills (NIB subsidiary), Western Kenya rice mills (NIB subsidiary) and the Tana Delta rice mill.
4. Additionally, there are over 250 small to medium rice mills which are privately owned. Majority of these are located within the Mwea region with the rest spread across other rice growing regions within the country.

Traders

5. The Government owned National Cereals and Produce Board (NCPB), is a key rice trader in the country. Other large scale traders include the NIB and LBDA, through their rice mills they process and supply milled rice to local retailers and supermarkets.
6. There are numerous small scale traders, mostly women, who sell rice in the local markets.

Sources: MAFAP - Analysis Of Incentives and Disincentives for Rice in Kenya, IOSR Journal - Analysis of Millers in Kenya's Rice Value Chain

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

- Men
- Women

Gender ratio (Female/Male)¹

Comparison of MRGM to the national context

- MRGM aims to be a **gender intentional** in their operations with gender being a strategic goal for the organization. The organization has also put in place policies and practices to make the workplace inclusive for both women and men.
- MRGM is marginally below the Kenyan national average of female to male employee ratio. Further, the male to female employee ratio of 0.81 indicates considerable participation of females within the organization.
- MRGM does not collect farmer data, such as yields, disaggregated by gender.
- Although gender inequalities still exists in the country, MRGM seeks to provide services that allow women to have more independence and control over resources.

How does MRGM's ratio of female to male employees compare with the country labor force participation?*1

Kenya

0.92

MRGM

0.81

How does MRGM's proportion of female to male farmers compare with the country-wide farmer distribution?⁴



N/A

How do the incomes earned by MRGM's employees compare with the incomes earned by women and men in the country?*1

0.70

0.80

How does the yield of MRGM's male and female farmers compare with the country average?*4

N/A

N/A

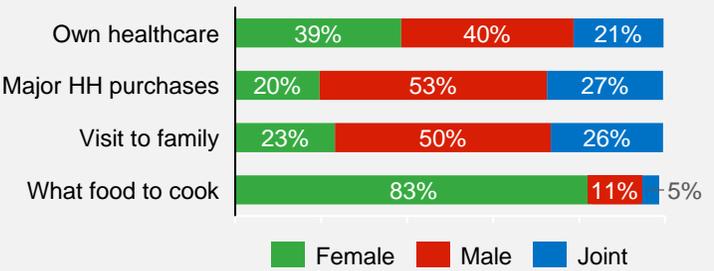
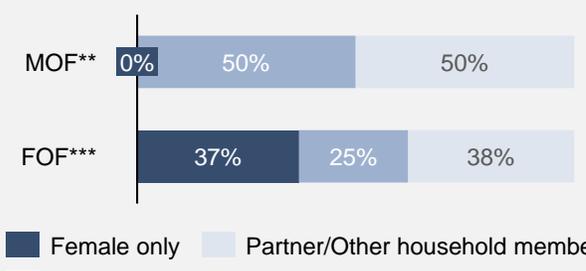
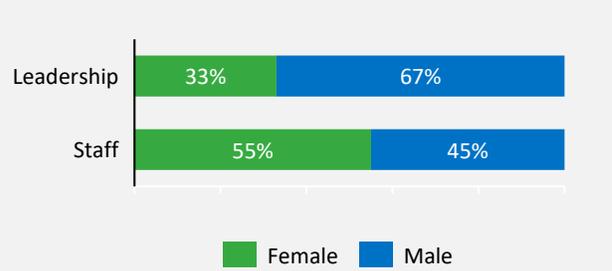
*Divide female indicator by male indicator to get ratio. A ratio of 1 indicates parity between the sexes; a ratio between 0 and 1 typically means a disparity in favor of males; whereas a ratio greater than 1 indicates a disparity in favor of females. **Own health care, major household purchases, and 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) KNBS – Economic Survey 2019

Gender

Although women play a key role in the production of rice, they remain visibly unrecognized

Gender Dynamics:

Category	Decision making	Decision making on productive activities	Women in Leadership
Score	Bad	Bad	Average
Data	<p>Women's involvement in decisions¹:</p> 	<p>Decision making responsibility in farm:</p> 	<p>Women in leadership – staff distribution</p> 

Category	Description of involvement	Detailed description of risk	Expected Impact
Involvement in household Activity	<p>Activities undertaken:</p> <ul style="list-style-type: none"> 100% of women cook, clean, fetch water, wash clothes or buy food 59% care for school age children 55% buy clothes for the household 	<ul style="list-style-type: none"> Disproportionate load of unpaid care work Limited time to engage in productive/economic activities and in training on GAP (time poverty) 	<ul style="list-style-type: none"> Women's exclusion of effective participation in agricultural value chains Lower Farm yields Unsustainable agricultural value chains
Involvement in Farm Activity	<p>Activities undertaken:</p> <ul style="list-style-type: none"> 92% of women are involved in planting and crop maintenance. 91% of women are involved in land preparation. Over 75% of women are involved in crop protection and harvesting activities. 	<ul style="list-style-type: none"> Uneven agricultural value distribution- women focused on low-grade and poorly remunerated activities, i.e. hoeing and weeding. 	<ul style="list-style-type: none"> Role of women invisible in agricultural value chains Unequal distribution of value along the agricultural value chain

*Female **Male-operated farms ***Female-operated farms, ¹KNBS (2014): Demographic and Health Survey, ²Prime Journals -Factors influencing agricultural productivity among rural women in Mwea

Food Security

Kenya has been facing severe food insecurity threats. Rice has been identified as one of the main crops for the attainment of food security in the country

Farmer's overall Food Security status

Category	Cash-flow (Stability & Access)	Food Security (Access & Availability)	Assets (Stability)
Score	Bad	Bad	Average
Data	<p>CASH FLOW</p> <p>60% of farmers experienced cash shortages in the last 12 months. Farmers are most cash-strapped in the months of September - November</p> <p>1 2 3 4 5 6 7 8 9 10 11 12</p> <p>Legend: >40% (Red), 30-40% (Orange), 10-30% (Yellow)</p>	<p>FOOD SECURITY</p> <p>40% of farmers expressed that they face food shortages during the last 12 months of the year. Farmers are most food insecure between September - November</p> <p>1 2 3 4 5 6 7 8 9 10 11 12</p> <p>Legend: >40% (Red), 30-40% (Orange), 10-30% (Yellow)</p>	<ul style="list-style-type: none"> Ownership: 69% of the farmers own all the land on which they farm Farm size: 2.5 acres Rice farm size: 2.5 acres (~100% of total land) Other crops: Most farmers focus mainly on growing paddy rice. However, tomatoes, onions, French beans and maize are grown in the Mwea irrigation scheme. Animals: 38% of farmers own livestock. Livestock reared is primarily chicken.
Category	Income (Access & Availability)	Market (Availability)	Health & Sanitation (Utilization)
Score	Good	Average	Average
Data	<ul style="list-style-type: none"> Rice sold: 98% of rice is sold Crop loss: 2% of rice is lost due to post-harvest activities Own consumption: 0% is consumed by farmer Price: Rice sells for c.79 KES/kg Income from crop: 70% of total income Income from other crops: 0%. Income from non-agricultural activities: 30% of total income Poverty line: Poverty line is USD 267/individual/year Household size: 5 people 	<ul style="list-style-type: none"> Per capita food production variability: 2.30¹ Global production: Kenya was ranked 68th worldwide in 2019 based on milled rice production. This was estimated at 80K MT². Export vs Import: Kenya is a net importer of rice. The country imports c.88% of its rice demand for local consumption. Local market: There are numerous small traders, mostly women who sell rice in the local markets, as well as a few large scale traders including the Government owned National Cereals and Produce Board. However, poor market coordination has resulted in market dominance by cartels and adulteration of rice. 	<ul style="list-style-type: none"> District level nutrition status: On average, 14.6 million Kenyans are undernourished. The prevalence of stunting among children under five years if age is 26 percent nationally. National average dietary energy supply adequacy: 98% Access to clean water: Yes Access to sanitation: 29.1% of the population has access to at least basic sanitation services

¹FAO, ²IndexMundi

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

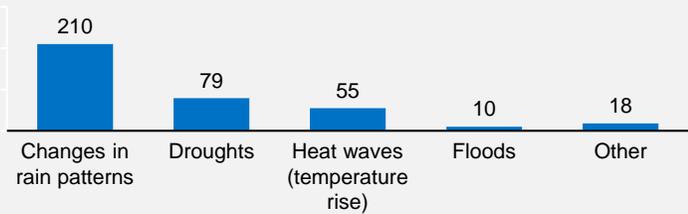
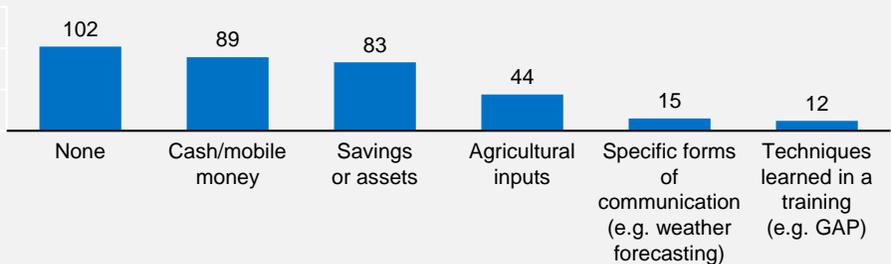
Farmer sensitivity and exposure to	Risk probability	Detailed description of risk	Impact	Expected impact
Changing temperatures	Medium	<ul style="list-style-type: none"> Kenya has experienced increasing temperature over the last 50 years. Future climatic predictions for Kenya indicate possible annual temperature increase of 2.3°C by 2050¹. Mwea rice farmers are facing chronic shortfall in water availability. This has forced the National Irrigation Authority to ration the water available to farmers. 	Average	<ul style="list-style-type: none"> Biodiversity loss and emergence of new pests and diseases. Reduced acreage of land under irrigation and cultivation resulting from water shortages. This will consequently reduce the paddy yield.
Changing rainfall patterns and soil conditions	High	<ul style="list-style-type: none"> Kenya is experiencing changes in the distribution, onset and cessation of rainfall seasons thus making it increasingly difficult to plan agricultural operations¹. Further, improper use of fertilizer has resulted in soil degradation. Continuous growing of rice crop in the Mwea region over the years with limited crop diversification has led to soil degradation. 	Severe	<ul style="list-style-type: none"> Decrease in the reliable cropping days and higher incidences of crop failure. Biodiversity loss and emergence of new pests and diseases. Declining soil fertility. To reverse this, farmers should consider intercropping to increase soil fertility.
Frequent climate extremes	High	<ul style="list-style-type: none"> Kenya has been experiencing deteriorating climatic conditions due to climate changes. The frequency of intense extreme weather events like droughts and floods is increased¹. Often heavy rainfall cause flooding in the region. 	Average	<ul style="list-style-type: none"> Little has been done to prepare for extreme climate change. As a result there could be reduced farm productivity due to changing climatic conditions. Damage to property, crop and irrigation infrastructure in the region.

¹Kenya Agriculture Climate Smart Agriculture Implementation Framework (2018 – 2027)

Climate Resilience

Investment in irrigation infrastructure can shield farmers in the Mwea region from fallout of erratic rainfalls

Farmer adaptive capacity

Category	Climate issues faced	Coping mechanisms																										
Data	<ul style="list-style-type: none"> 74% of farmers experienced crop losses due to extreme weather events. 56% of the extreme weather events relate to changes in rain pattern and 21% to drought.  <table border="1"> <caption>Climate issues faced</caption> <thead> <tr> <th>Issue</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>Changes in rain patterns</td> <td>210</td> </tr> <tr> <td>Droughts</td> <td>79</td> </tr> <tr> <td>Heat waves (temperature rise)</td> <td>55</td> </tr> <tr> <td>Floods</td> <td>10</td> </tr> <tr> <td>Other</td> <td>18</td> </tr> </tbody> </table>	Issue	Count	Changes in rain patterns	210	Droughts	79	Heat waves (temperature rise)	55	Floods	10	Other	18	<ul style="list-style-type: none"> 30% of the farmers have no adaptation strategy to cope with crop loss as a result of extreme weather. No farmers reported to have used insurance to minimize crop loss.  <table border="1"> <caption>Coping mechanisms</caption> <thead> <tr> <th>Mechanism</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>None</td> <td>102</td> </tr> <tr> <td>Cash/mobile money</td> <td>89</td> </tr> <tr> <td>Savings or assets</td> <td>83</td> </tr> <tr> <td>Agricultural inputs</td> <td>44</td> </tr> <tr> <td>Specific forms of communication (e.g. weather forecasting)</td> <td>15</td> </tr> <tr> <td>Techniques learned in a training (e.g. GAP)</td> <td>12</td> </tr> </tbody> </table>	Mechanism	Count	None	102	Cash/mobile money	89	Savings or assets	83	Agricultural inputs	44	Specific forms of communication (e.g. weather forecasting)	15	Techniques learned in a training (e.g. GAP)	12
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Enabling Environment

The Kenyan Government is committed to increasing local rice production and has embraced PPPs to encourage private sector participation and investment in the sector

Definition	Situation	Impact on SDM
Technology	<ul style="list-style-type: none"> Although mechanization and application of appropriate technologies suitable for farmers has a huge potential in promoting rice production, there remains low technical knowhow on rice production technology among extension staff, farmers and processors¹. 	<ul style="list-style-type: none"> There exists opportunities to adopt technological solutions in rice production with proper training amongst staff.
Environment	<ul style="list-style-type: none"> 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 issues². 	<ul style="list-style-type: none"> Training farmers on GAP which promote proper agrochemical practices to avoid pests and disease has potential to increase farmer productivity. MRGM farmers are currently benefitting from irrigation services offered by the National Irrigation Authority. Irrigation adoption has potential to minimize crop loss occasioned by drought.
Infrastructure	<ul style="list-style-type: none"> Poor infrastructure and uneven distribution of rice mills has led to a decline in rice production in the country. Infrastructure development such as roads, dams, irrigation and drainage, electricity, communication and viable public /private sector partnerships have the potential to improve the farming systems for SHFs resulting into poverty alleviation and economic growth¹. 	<ul style="list-style-type: none"> Lack of proper infrastructure affects seamless delivery of services and inputs to the farmers. Further, this could result in high transportation costs incurred in delivery of paddy to the processing mill. Water shortage within the Mwea irrigation scheme has been identified as the biggest challenge to paddy production. Lack of reliable water sources could impact on farmer production activity as well as constrain expansion of the scheme. However, the Government of Kenya, through the National Irrigation Authority, is working to address this challenge through dam construction.
Labor	<ul style="list-style-type: none"> Rural urban migration has rendered labor unavailable and expensive. Traditionally, most farming families depend on family labor to carry out various farming activities partly to reduce production costs and partly because it is available on demand during labor peaks¹. 	<ul style="list-style-type: none"> MRGM has invested in mechanization which has in turn reduced the need for manual labor throughout the rice production process.
Inputs & Financing	<ul style="list-style-type: none"> Lack of collateral to access credit has resulted to poor inputs access, and consequently low productivity and low income for the SHF¹. The high cost of farm inputs and machinery is a disincentive in increase of rice productivity¹. 	<ul style="list-style-type: none"> MRGM offers farmers input on credit. Further, Lainisha SACCO, which draws its membership from the MRGM farmers, extends loans and cash advances which are used to pay for services from the Society.

Enabling Environment

Poor market organization has resulted in the growing illegal rice trade through rice adulteration

Definition	Situation	Impact on SDM
Trading System	<ul style="list-style-type: none"> Kenya is a member of both the Eastern African Community (EAC) and COMESA regional trading blocks. There is a lot of informal cross-border trade with Uganda and Tanzania. Further there is rice seed movement across the borders which may not have undergone formal certification that could be detrimental to rice sub-sector development¹. However, the trading blocs presents major trading opportunities and sharing of germ-plasm¹. 	<ul style="list-style-type: none"> Existence of the trading blocs presents a market for MRGM rice products. Although rice produced by the farmers within the Mwea region is of a higher-quality than most imported varieties, competition remains stiff as the imported varieties are much cheaper. Lack of proper market coordination could exacerbate this situation.
Pricing & Competition	<ul style="list-style-type: none"> There are rampant incidences of importation of cheap poor-quality rice which is fraudulently repackaged and sold in the local market. This presents unfair competition to locally produced rice¹. 	<ul style="list-style-type: none"> Rice adulteration and illegal trade continues to pose unfair competition for MRGM. However, this also presents the Society with an opportunity to introduce rice products that would compete with the cheaper imports.
Institutional Stability	<ul style="list-style-type: none"> Kenya has made significant political, structural and economic reforms that have largely driven sustained economic growth, social development and political gains over the past decade². These reforms have resulted in the country's stable institutions. 	<ul style="list-style-type: none"> Government organizations such as KALRO continue to support farmer effort through coordinated research efforts on inputs particularly high yielding seeds.
Land Tenure	<ul style="list-style-type: none"> Land tenure system in the rice growing schemes is not favorable to farmers as they do not own land titles making it impossible to access credit¹. Women are key players in rice production, however, as a result of the patriarchal land system, they are yet to own land¹. 	<ul style="list-style-type: none"> Uncertainty in land tenure disincentivizes investment into the sector. Land succession issues and sub-division of land parcels in the Mwea scheme poses challenges in increasing Society's farmer membership as well as farmer land size.
Social Norms	<ul style="list-style-type: none"> In the irrigation schemes high prevalence of waterborne diseases such as malaria and bilharzia affects the productive ability of farmers. In addition HIV/AIDS has greatly affected the productive work force of the rural farming communities¹. 	<ul style="list-style-type: none"> MRGM has incorporated training on basic sanitation into their farmer training program. This training is offered in partnership with local health workers.

Sources: ¹Ministry of Agriculture – National Rice Development Strategy (2008 – 2018), ²World Bank – Kenya Country Overview

SDM strategy

Understanding the SDM's strategy and business model

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Strategy

MRGM has set a target to reach 30% market share in Mwea paddy sourcing trade by 2023, and has set sight on moving up the value chain by continuing to invest in their white rice brands



Goals & Aspirations

Mwea regional paddy market share:

- Market share in paddy – reach market share of 30% (or 300,000 bags) of paddy produced in Mwea region.
- This enables MRGM to emerge as the largest rice trader in Mwea region.

Branded white rice products:

- Invest in MRGM white rice brands towards further premiumization.
- Extend the reach of MRMG brands to wider regions in Kenya while cementing the preference for MRGM brands among existing consumers.



Where to Play

- **Strengthen relationship with farmers** to reduce churn rate of farmers while simultaneously increasing their loyalty.
- Focus **marketing efforts** in regions having relatively less competition from other brands.
- Increase the **reach of MRGM products** by partnering with large supermarkets chains and large standalone stores



How to Win

- **Reduce the delay in payments for paddy** Secure working capital to pay for at least 50% of the amount due to farmers on procuring their paddy
- **Member services** – Ensure timely and efficient services to the members throughout the crop season whilst ensuring services offered are attractive to members.
- **Lead farmer** – develop a core network of lead farmers who can champion MRGM services amongst farmers in the region.
- **Brand penetration** – establish marketing strategy that can build a widely visible MRGM white rice brands having loyal consumer base.



Capabilities Required

- Staff skilled at scaling operations efficiently and effectively
- Improve **machinery at factory** to support increasing volumes of high-quality rice processing
- Invest in **technology and systems** for managing effective service delivery to farmers, for timely and hassle-free distribution of white rice to retailers and smooth functioning of internal operations
- **Brand building** culture – MRGM need to bring in and imbibe brand building expertise

About MRGM

MRGM is working towards increasing their market share from the current 10% to 30% by 2023

About MRGM

- MRGM is involved in the entire rice value chain from crop production to processing and marketing. Its business model involves supporting members to grow rice with an expectation that the members deliver the produce to the Society mills for processing and marketing.
- The farmers are paid after the rice has been processed and a good amount of it sold which ordinarily takes c.5 months. This model has worked over time but market dynamics are demanding a change where many farmers are now opting to sell their rice to cash buyers. However due to cash constraints MRGM is not in a position to purchase all the paddy supplied in cash.
- The Society offers services including sale of farm inputs and mechanization to non-members. These are extended on a cash basis with a view to generate cash for the Society. Training is offered to non-members for free.
- The organization is run by a nine member Board of Directors and three supervisory committee members elected by the Society members. The day to day operations are headed by the General Manager supported by 50 members of staff.

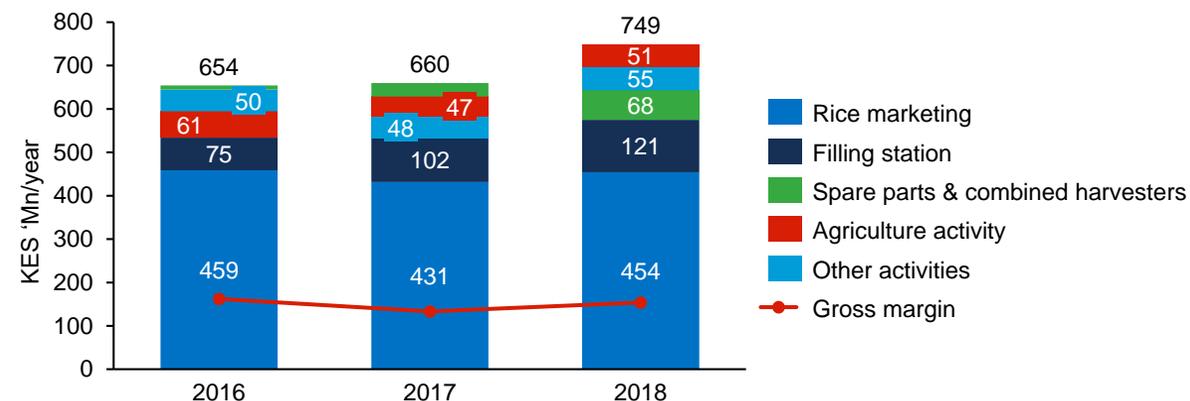
Society membership

- It is estimated that 89% of the total rice farmers in the Mwea region are members of the Society. However, only 42% of the members are currently active.
- MRGM is looking to increase the Society's membership to 9,000 members by 2025 with 5,000 members (56%) remaining active.



Historical performance

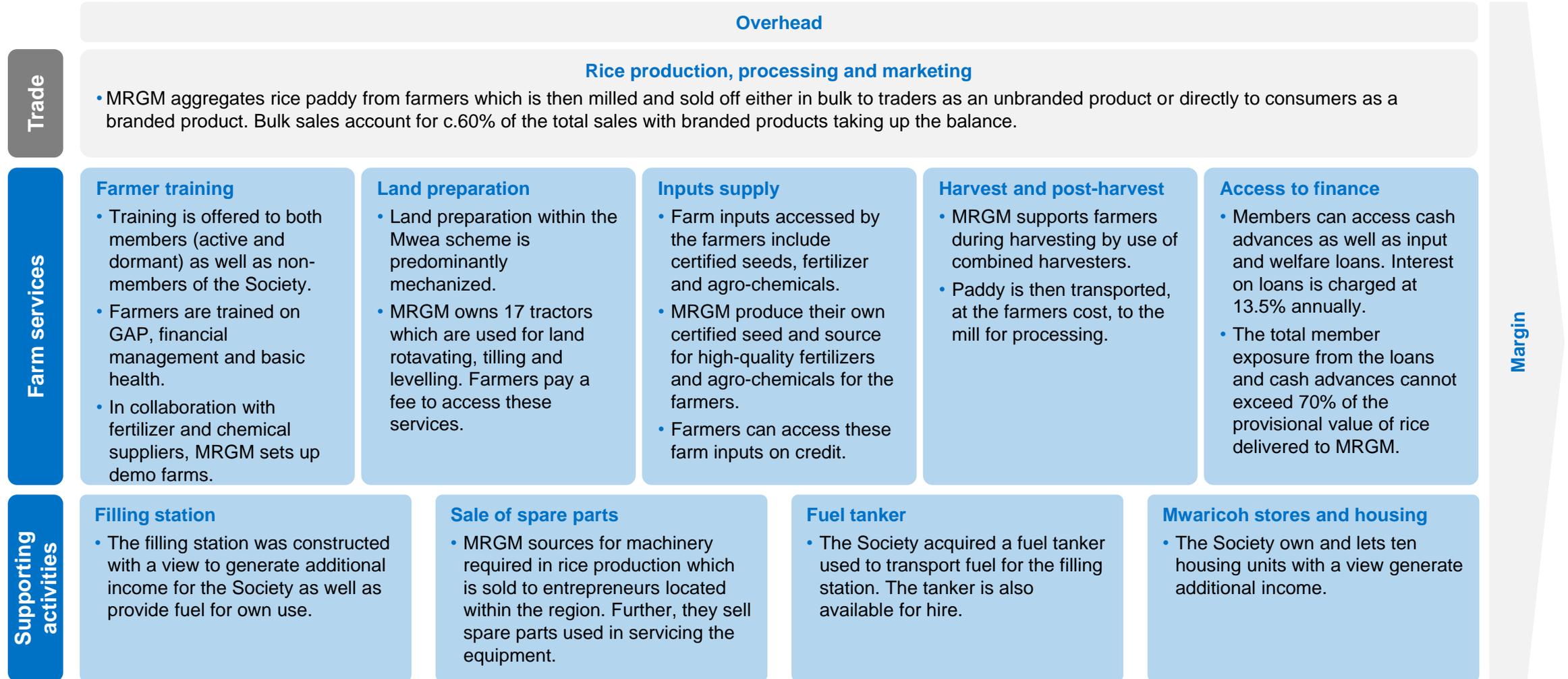
MRGM revenue (2016 – 2018)



- Rice marketing, the Society's main activity, accounted for c.65% of the entity's revenue between 2016 and 2018.
- Filling station relates to sale of motor fuel from the Society owned station. This service is not directly offered to farmers but forms part of the support services offered as MRGM uses their own fuel. Fuel is also sold to non-members of the Society.
- Other activities mainly include motor vehicle renting activities, sale of lubricants and spare parts as well as sale of fertilizer.
- The Society's asset base as at December 2018 amounted to KES 427 million with liabilities amounting to KES 231 million.

Services

MRGM is focused on ensuring timely and efficient services are delivered to the members throughout the crop season



Overhead

Rice production, processing and marketing

- MRGM aggregates rice paddy from farmers which is then milled and sold off either in bulk to traders as an unbranded product or directly to consumers as a branded product. Bulk sales account for c.60% of the total sales with branded products taking up the balance.

Trade

Farm services

Farmer training

- Training is offered to both members (active and dormant) as well as non-members of the Society.
- Farmers are trained on GAP, financial management and basic health.
- In collaboration with fertilizer and chemical suppliers, MRGM sets up demo farms.

Land preparation

- Land preparation within the Mwea scheme is predominantly mechanized.
- MRGM owns 17 tractors which are used for land rotavating, tilling and levelling. Farmers pay a fee to access these services.

Inputs supply

- Farm inputs accessed by the farmers include certified seeds, fertilizer and agro-chemicals.
- MRGM produce their own certified seed and source for high-quality fertilizers and agro-chemicals for the farmers.
- Farmers can access these farm inputs on credit.

Harvest and post-harvest

- MRGM supports farmers during harvesting by use of combined harvesters.
- Paddy is then transported, at the farmers cost, to the mill for processing.

Access to finance

- Members can access cash advances as well as input and welfare loans. Interest on loans is charged at 13.5% annually.
- The total member exposure from the loans and cash advances cannot exceed 70% of the provisional value of rice delivered to MRGM.

Margin

Supporting activities

Filling station

- The filling station was constructed with a view to generate additional income for the Society as well as provide fuel for own use.

Sale of spare parts

- MRGM sources for machinery required in rice production which is sold to entrepreneurs located within the region. Further, they sell spare parts used in servicing the equipment.

Fuel tanker

- The Society acquired a fuel tanker used to transport fuel for the filling station. The tanker is also available for hire.

Mwaricoh stores and housing

- The Society own and lets ten housing units with a view generate additional income.

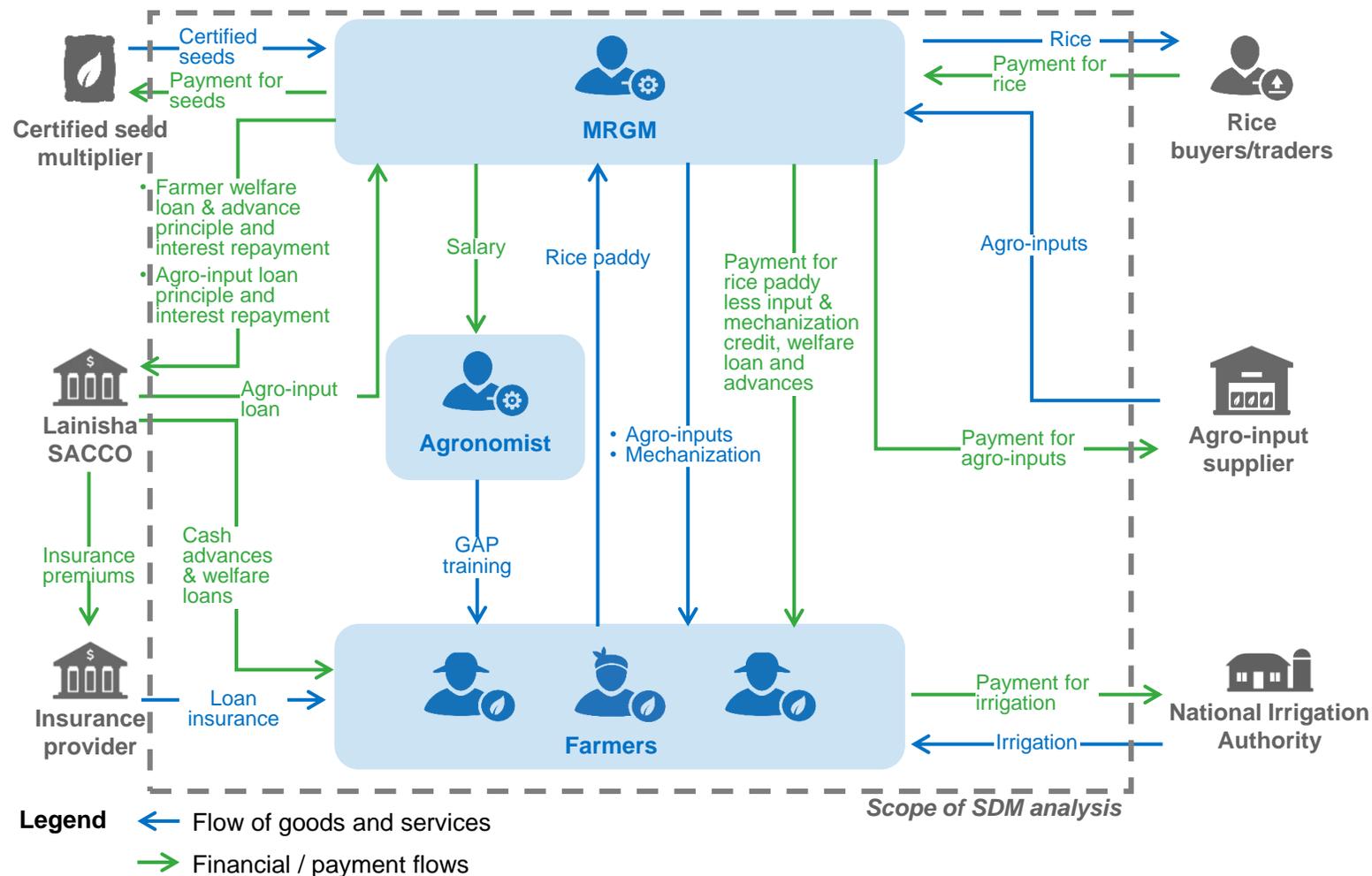
Partners

MRGM works in collaboration with government organisations and local input suppliers in delivering services to farmers

Actor	Legal Status	Function (within this SDM)	Revenue model (within this SDM)	Incentive to participate (within this SDM)
 Mwea Rice Growers Co-op Society Ltd	Society	<ul style="list-style-type: none"> SDM operator Provision of agro-inputs, on-farm services and training to farmers Rice processing and marketing 	<ul style="list-style-type: none"> Margins on trade of rice products Payment for inputs and services 	<ul style="list-style-type: none"> Increased sales revenue
Seed multipliers (farmers)	N/A	<ul style="list-style-type: none"> Provide certified seeds for rice production 	<ul style="list-style-type: none"> Payment for certified seeds 	<ul style="list-style-type: none"> Increased sale of certified seeds
Input providers	Private company	<ul style="list-style-type: none"> Provide agro-inputs to farmers 	<ul style="list-style-type: none"> Payment for agro-inputs 	<ul style="list-style-type: none"> Increased sales of seeds, fertilizer and agrochemicals
 LAINISHA SACCO MY CHOICE	SACCO Society	<ul style="list-style-type: none"> Provide welfare loans and advances to farmers for purchasing inputs 	<ul style="list-style-type: none"> Interest rates on loans Processing fees 	<ul style="list-style-type: none"> Attract new agri customers Provide value-add service to farmers
Insurance companies	Private company	<ul style="list-style-type: none"> Provide loan insurance services to farmers 	<ul style="list-style-type: none"> Insurance premium payment 	<ul style="list-style-type: none"> Increased sales of insurance products Attract new agri customers
Capwell Industries	Private company	<ul style="list-style-type: none"> Bulk purchaser of unbranded rice 	<ul style="list-style-type: none"> Margins from packaging and trading of rice products 	<ul style="list-style-type: none"> Increased sales revenue
	Foundation	<ul style="list-style-type: none"> Supporting design of SDM Prototype SDM models through technical assistance 	<ul style="list-style-type: none"> None (grant funded) 	<ul style="list-style-type: none"> Catalyse investment into smallholder business models to create sustainability at scale
	Government Agency	<ul style="list-style-type: none"> Provide water for irrigation within the Mwea rice scheme 	<ul style="list-style-type: none"> Payment for irrigation 	<ul style="list-style-type: none"> Provide value-add service to farmers

Key channels

Understanding farmer needs is critical in identifying how best to service the farmers



Service delivery channels

- MRGM has employed a full-time agronomist who conducts farmer field trainings throughout the year.
- The farmers are grouped into five sections (groups). Each section is trained at least four times each year. At a minimum, 200 farmers attend each training session.
- Stakeholders including fertilizer and crop protection suppliers, Lainisha SACCO representatives and local health workers are involved in farmer training. They train farmers on GAP, financial management and basic health, respectively.
- Only active MRGM members can access cash advances from Lainisha SACCO. Repayment for such advances is deducted from the provisional value of the paddy rice delivered to MRGM.
- Mechanization services include land preparation (tilling, rotavating and levelling) as well as harvest and post harvest services (combined harvester and paddy drying). These services can be accessed on credit by the active farmers.

Key clients

For this SDM study, farmers are categorised into three customer profiles. MRGM plans to grow the active member base as part of their business expansion plan



Baseline

Segment 1

Segment 2

Description

- The farmer is not involved in the SDM.

- The farmer is a dormant member of the Society.

- The farmer is an active member of the Society.

Key characteristics

- Farmer does not sell any produce to MRGM

- Farmer has not signed a service agreement with MRGM and is therefore not obliged to delivery rice paddy to the operator. However, in some instances, farmer sells their produce to MRGM.

- Farmer has signed a service agreement with MRGM and is obliged to delivery at least 10 paddy bags/acre to the Society following harvest.

Services

- Farmer may attend GAP trainings offered by SDM operator
- Farmer does not hire any services or purchase inputs from the SDM operator. They however can access certified seeds from the MRGM shop.

- GAP training
- Could purchase seeds and agro-inputs on cash basis
- Mechanization services on cash basis

- GAP training
- Seeds and agro-inputs
- Mechanization service
- Credit and advances

Number of farmers

- Segment 1
- Segment 2



SWOT Analysis

MRGM has a strong incumbent advantage in Mwea paddy trade which, if leveraged well, can help MRGM meet its 2023 target

	Helpful	Harmful
Internal	<p>Strength</p> <ul style="list-style-type: none"> • Longstanding and loyal farmer membership base • Extensive business experience in basmati and pure pishori rice market • Minimum default on loans and advances due to better knowledge about individual farmers and supportive co-operative legal framework • Established infrastructure and assets in the region • Substantial vertically integrated player starting from involvement with farmers in paddy cultivation, processing of paddy, distribution of white rice and retailing of premium white rice brands 	<p>Weakness</p> <ul style="list-style-type: none"> • Inadequate working capital has been a bottleneck in gaining market-share of paddy sourced from farmers • Long cash conversion cycle necessitating more working capital • Insufficient number of farm machines (tractors and harvesters) for fully meeting the demand • Limited brand awareness (white rice brands) across the country • Internal technology and systems are behind the curve or altogether absent in meeting the business requirements
External	<p>Opportunities</p> <ul style="list-style-type: none"> • Large number of farmers to tap into for expanding active farmer membership (from current 2,100 farmers to 14,000) • Operationalize idle reception centers at each section • Diversify into soya crop which complements paddy crop • Premiumization of MRGM white rice brands will improve profit margins • Increase productivity potential from improve water availability once Thiba dam construction is completed 	<p>Threat</p> <ul style="list-style-type: none"> • Availability of cheaper rice imports • Inadequate water in irrigation scheme and climate challenges (drought and floods) • Intensifying competition from other traders • Membership churn due to succession and land sub-division • Competition from retail players in premium brand space

SWOT

SDM performance

Assessing the SDM's financial performance and opportunities for improvement

- [Introduction](#)
- [Context](#)
- [SDM strategy](#)
- [SDM performance](#)**
- [Farmer performance](#)
- [Assumptions](#)
- [Concluding slides](#)

Sourcing targets, volumes and feasibility

MRGM is targeting to increase the volumes sourced by 192% by 2024. This will result in a pre-tax net income growth of 162% over the period

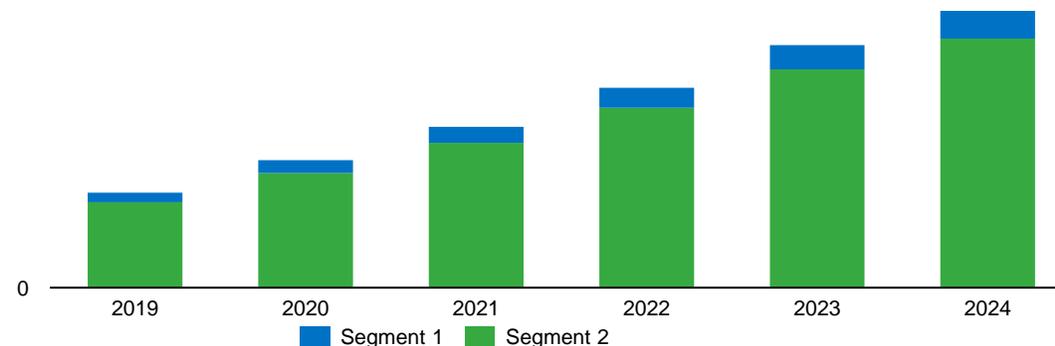
Growth drivers

- Current farmer base is set to increase by 500 active farmers each year driven mainly by:
 - Increase in the number of rice farmers in the region resulting from completion of the Thiba dam construction which is expected to double production in the scheme;
 - Active marketing, farmer mobilization and recruitment;
 - Supporting members with attractive service packages.
- Growth in paddy volumes sourced is driven by the growth in the active farmer base. However, there is potential to increase this further through improving farmer loyalty.
- Whilst MRGM pays the farmer a premium in comparison to other local paddy buyers, farmer loyalty remains low due to the delay in payment to the farmers for paddy delivered. Lack of adequate working capital will hinder scaling of the SDM if not addressed.

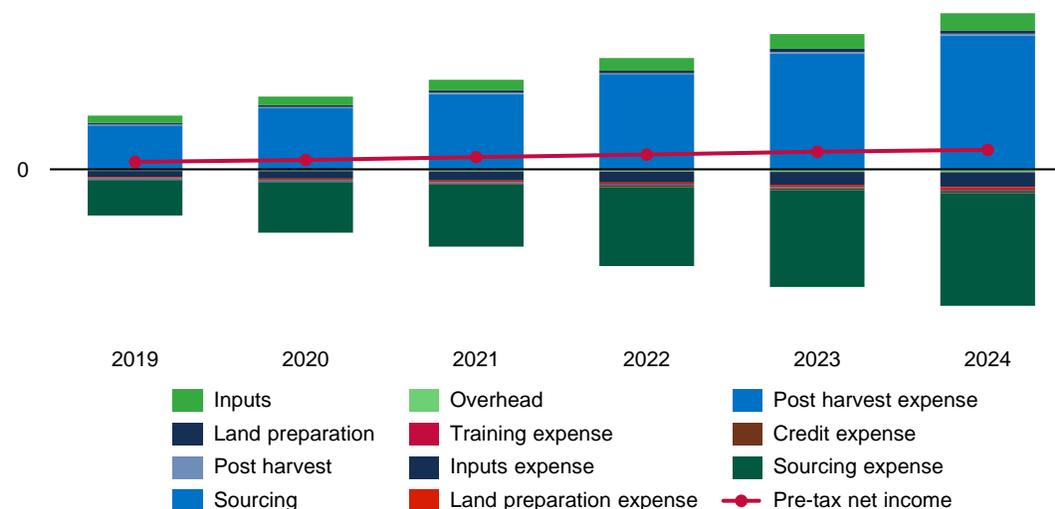
SDM P&L

- The total SDM pre-tax net income is projected to increase by a CAGR of 21% between 2019 and 2024 mainly due to:
 - Increase in land preparation services net income (27% CAGR);
 - Increase in volume of paddy sourced (24% CAGR) which results in a 21% CAGR growth in rice trading net income from 2019 to 2024.
- Farmer training and credit services are not expected to break even over the SDM review period. MRGM offers training free of charge to the farmers and as such this service does not generate direct revenue to the business. On the other hand, credit is offered to farmers indirectly through provision of inputs and services.

SDM scale (# of paddy bags sourced)



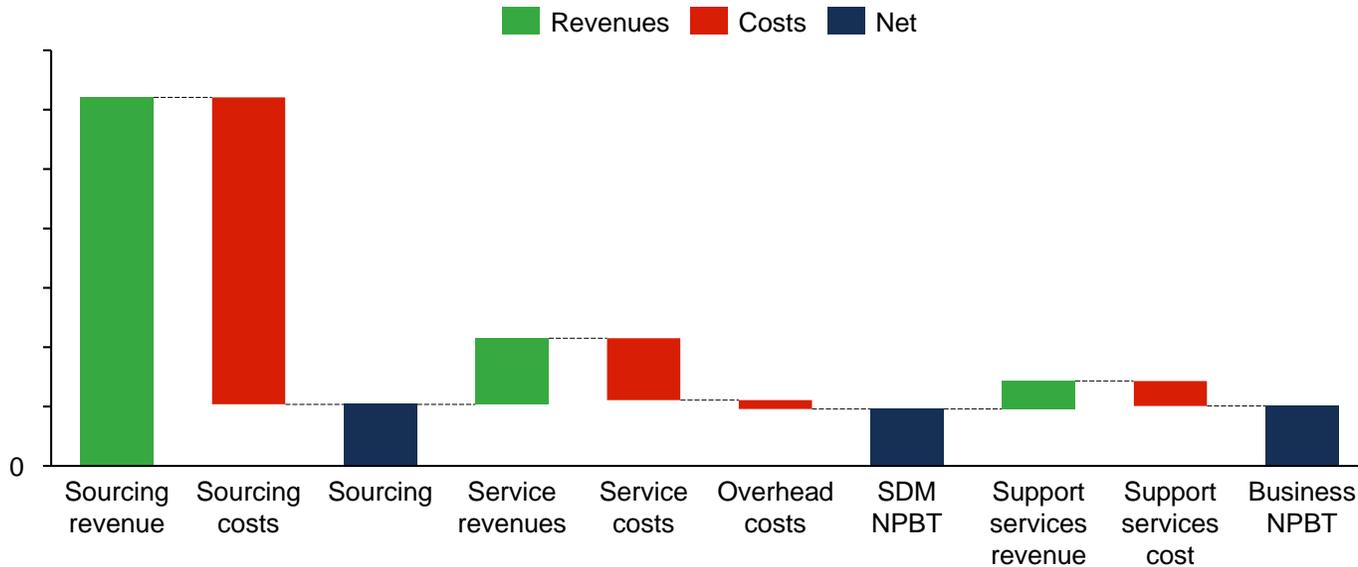
SDM P&L (per year)



Profit and loss

Including support services, MRGM projects to increase the pre-tax net profit by 157% from 2019 to 2024

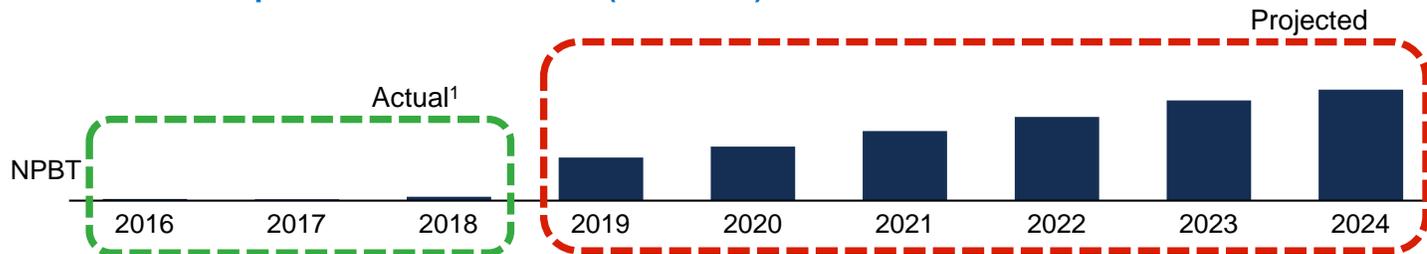
Business P&L (USD, cumulative 2019 – 2024)



Business P&L

- Between 2019-2024, MRGM’s core business operations of paddy sourcing, processing and rice sales contribute biggest share of revenue and profits for the company.
- Support services offered by MRGM include filling station services, sale of spare parts, fuel tanker leasing and renting of the Mwaricoh stores and housing units.
- The filling station provides services through sale of petrol, diesel, kerosene and lubricants. This service is both for internal (c.30%) as well as external (c.70%) use.

Business NPBT performance over time (‘000 USD)



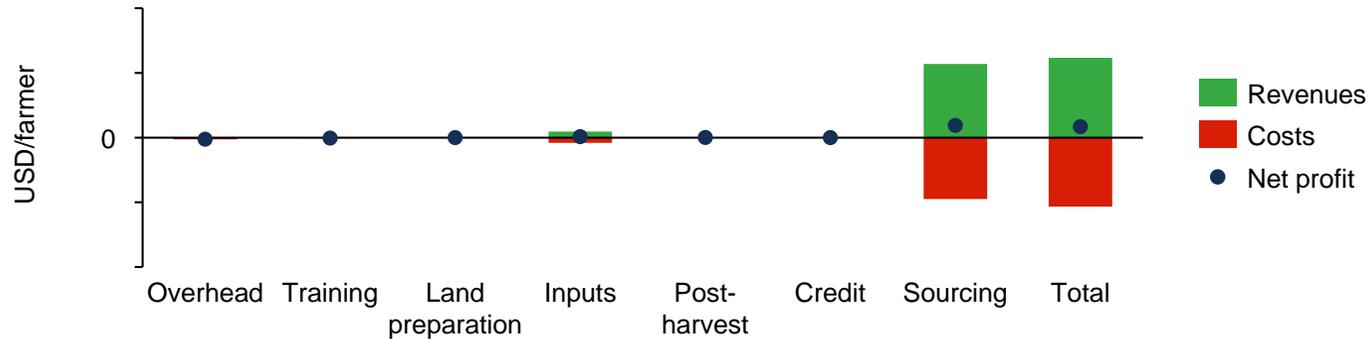
Sources: ¹FY18 and FY17 Audited Financial Statements

SDM cost and income per farmer

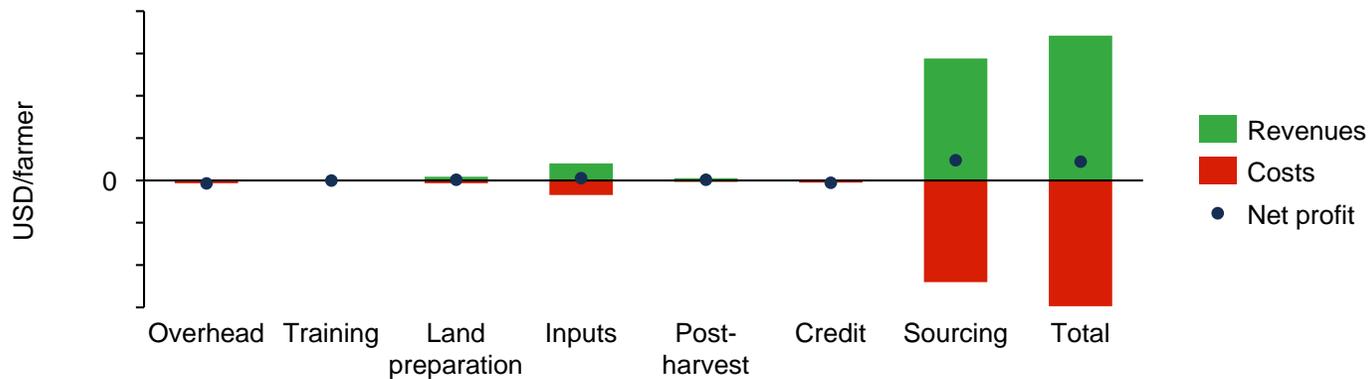
Net profit per farmer is higher for servicing an S2 farmer. MRGM should consider graduating more S1 farmers into S2

Per farmer cost & net income (average 2020 – 2024)

Segment 1 (S1)



Segment 2 (S2)



Net income and cost per farmer

- S2 farmers are full service farmers with terms of transaction contract signed between the farmer and MRGM
- Total cost per S2 farmer is much higher than that for an S1 farmer mainly due to:
 - The larger quantities of produce sold by the S2 farmer to MRGM resulting in higher sourcing costs;
 - The wider range of services taken-up by the S2 thus increase the cost to serve the segment.
- Consequent to higher cost to serve S2 farmer, the net income per S2 farmer is also higher than that of from an S1 farmer
- Major share of income to MRGM accrues from sourcing of paddy from farmers with small contributions from margin on inputs and mechanization. Hence, MRGM should do well to prioritizing service delivery to farmers that are loyal in supplying paddy to them.
- Given the high cost of buying farm machinery such as tractors and combine harvesters – we recommend MRGM to not invest in additional capacity to serve S1 farmers. Were there some spare capacity MRGM can provide to S1 farmers, they should be charged rent similar to those charged by other competitors

Farmer performance

Assessing farmer impact and opportunities for improvement

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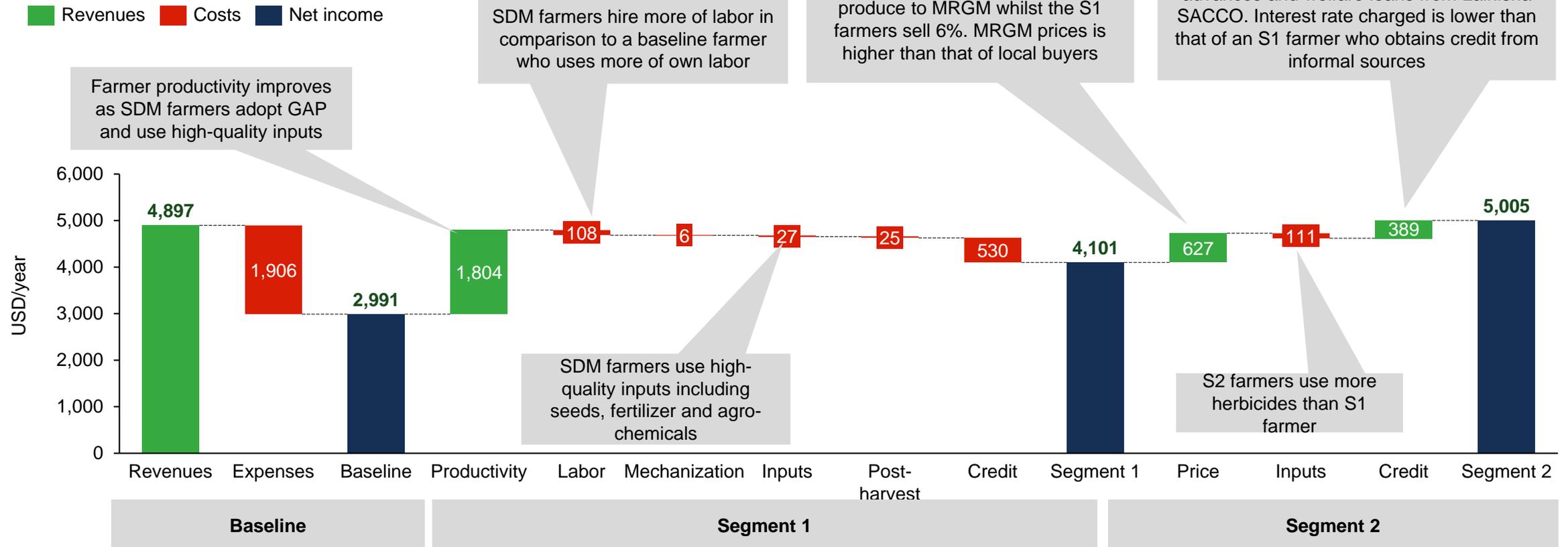
[Concluding slides](#)

Farmer profit and loss per farmer segment

On average, an S2 farmer earns 22% more net income than an S1 farmer mainly driven by higher revenue from sale of more paddy to MRGM and the cheaper cost of credit

Comparing net incomes of baseline and SDM farmers

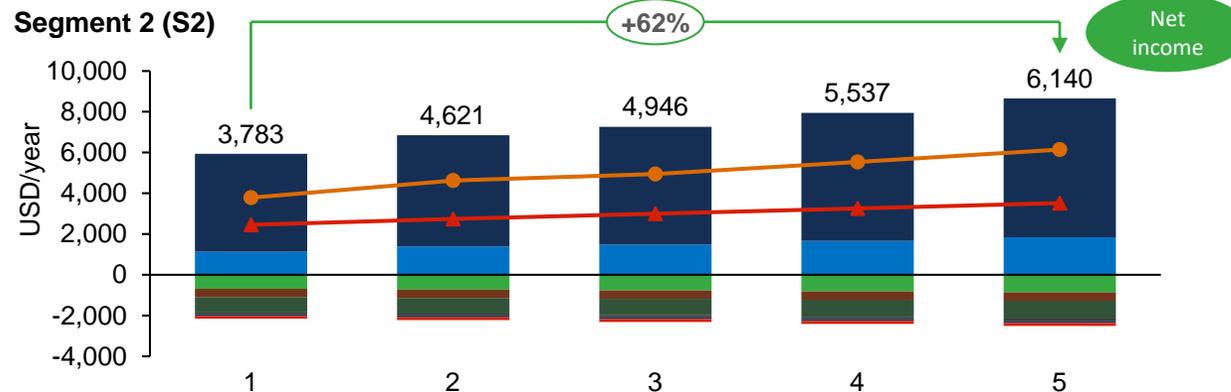
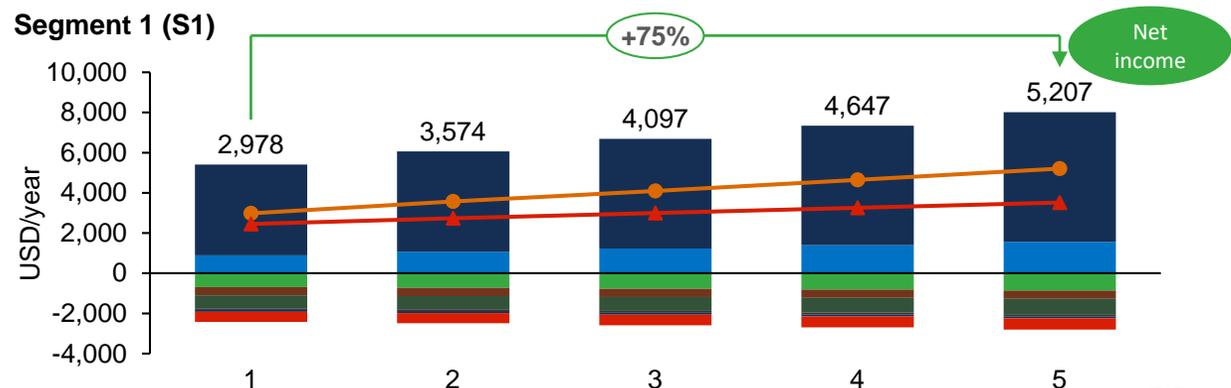
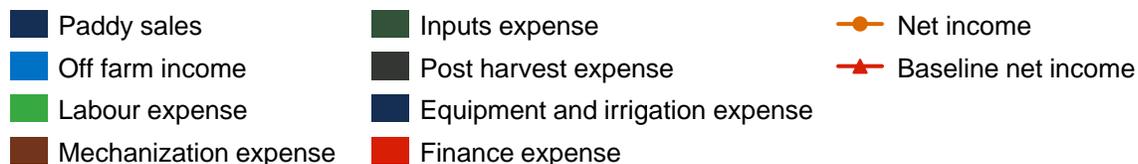
Split by revenue and expenses drivers



Farmer profit and loss over time

S1 and S2 farmers are expected to earn 37% and 67% more net income respectively than a baseline farmer indicating there exists a case for farmers to join the SDM

Net incomes of baseline and SDM farmers



Impact on farmer incomes

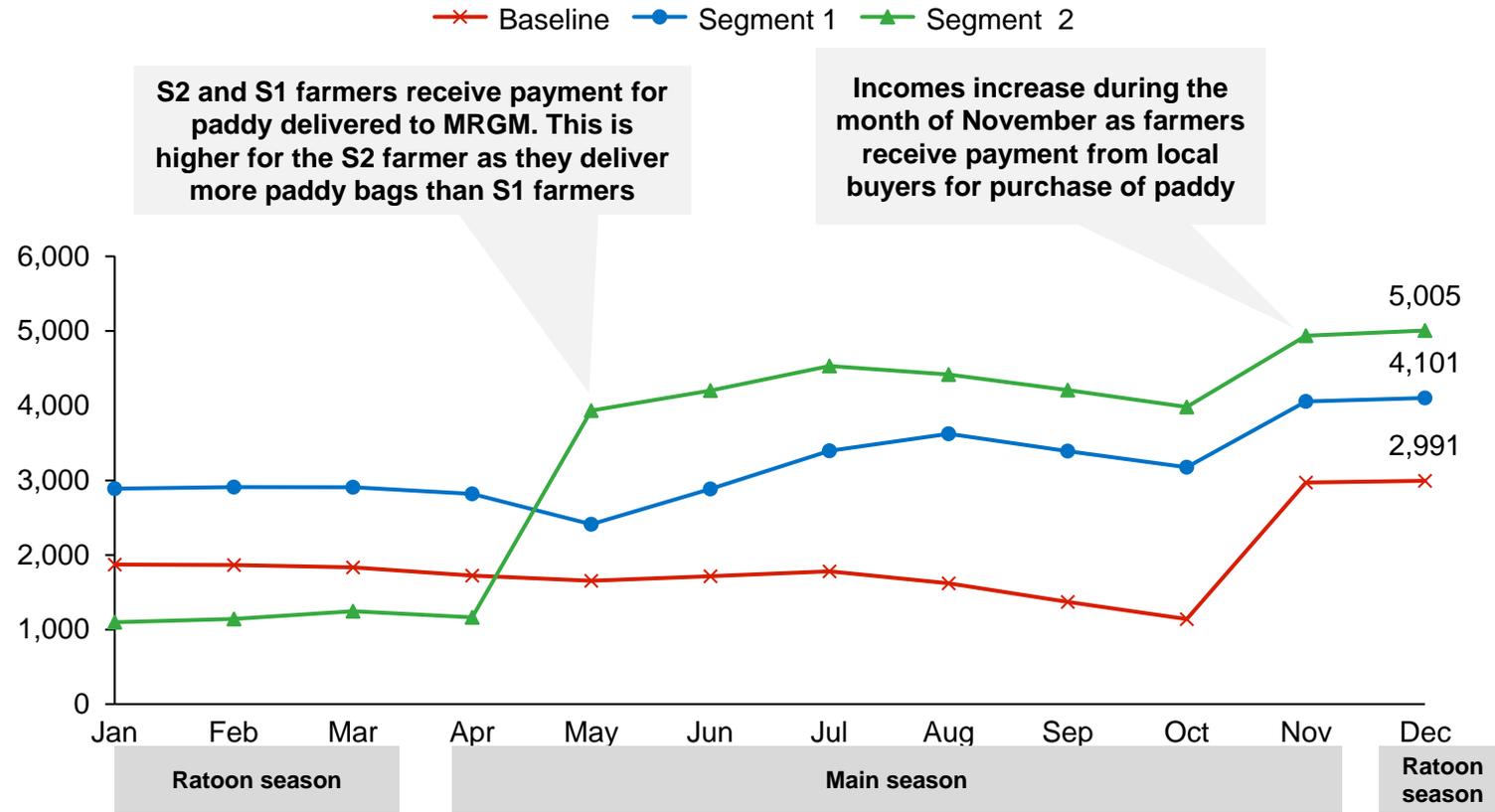
- Both S1 and S2 farmers are expected to earn more than a baseline farmer. This is mainly driven by:
 - Improved farm yields (36% higher) as a result of applying GAP and high-quality inputs;
 - The SDM farmers selling a portion of their produce to MRGM which pays a premium price. Baseline farmers sell their produce to local buyers.
- Baseline farmers do not incur cost of purchasing certified seed as a majority of them prefer to use own seed from the previous crop harvested. Recycling of the seeds contributes greatly to the lower farm yields. Further, the baseline farmer does not incur financing costs as they do not take on credit to finance farming activities.
- S1 and S2 farmers incur financing expenses as they access credit to finance input and farm services including post-harvest and mechanization. While the S2 farmer access the credit from MRGM, the S1 farmer accesses this from informal lenders whose interest rate is almost 2.5 times higher than that charged to S2 farmers.
- Farmers can increase their net income by selling additional bags to MRGM. Currently, due to inability of MRGM to pay farmers for paddy upon delivery, farmers opt to deliver the minimum number of bags (10 bags/acre) they are contractually bound to by MRGM. Additional bags are sold to local buyers.

Farmer cash-flow

The cumulative farmer cash flow remain positive throughout the year indicating farmers have sufficient funds to cover their projected expenses during a given year

Comparing cash flows of Baseline and SDM farmers

Cumulative in USD/month



Farmer cash-flow

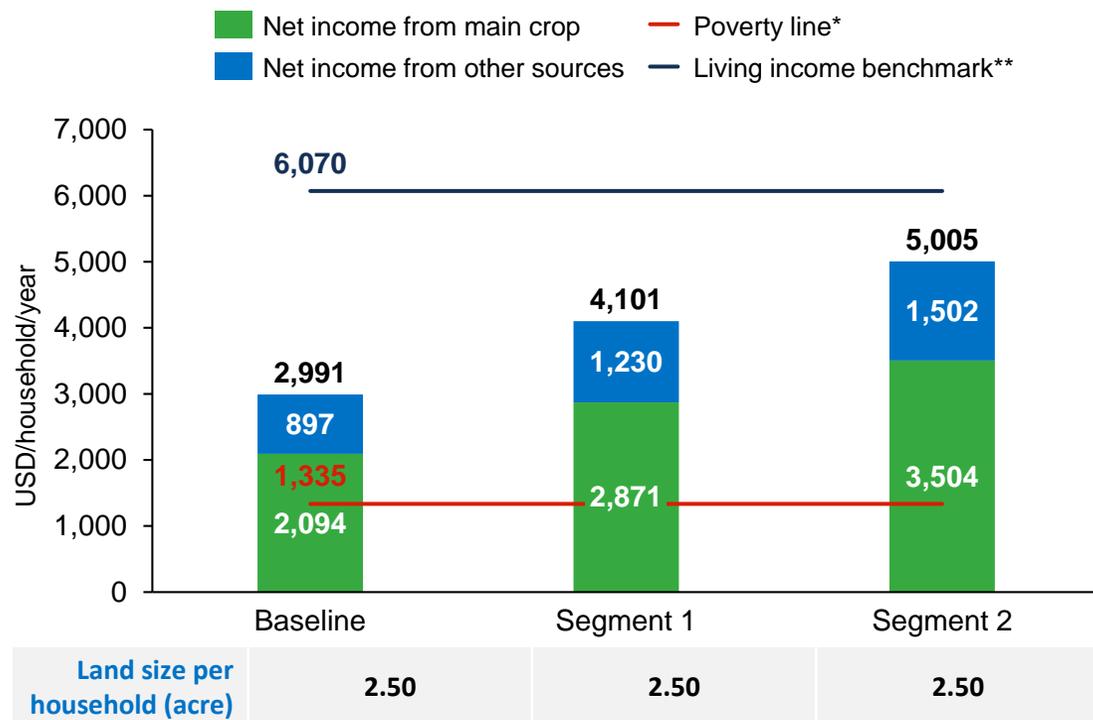
- The graph alongside represents the projected cumulative monthly cash-flow for the various segments. This is based on the average farmer income between year 1 and year 5.
- For baseline and S1 farmers, the highest monthly income is earned in January. This results from payment of rice paddy by local buyers, who purchase the bulk of their rice, and lower expenses during the month.
- For the S2 farmer, the highest monthly income is earned in May which is when they receive payment from MRGM.
- Highest single month expenditure is incurred in the month of May for the S2 farmer and November for the S1 farmer. This is due to repayment of credit facilities taken by the farmers. Repayment for credit is timed for when farmers receive payment for paddy.

Farmer livelihoods

Total farmer net income from the main crop is expected to remain above the poverty line throughout the SDM period. No farmer is expected to reach the minimum living income target

Comparing household income, living income benchmark and poverty line

Shown for each farmer segment



Impact on farmer incomes

- Given that envisioned service impacts will materialize, the SDM significantly boosts farmer incomes from rice from **\$2,094 to \$3,504** per household per year. Key income drivers are discussed under [farmer profitability](#) and [farmer cash-flow](#).
- All farmers** will be able to **earn more than the Worldbank poverty line** from rice alone.
- With rice incomes alone, **all households will be earning below the living income benchmark** by \$3,976, \$3,199 and \$2,566 per household per year for baseline, segments 1 and 2 respectively. Including farmer income from other sources, the gap is slightly reduced to \$3,079, \$1,969 and \$1,065 for the baseline, segment 1 and 2 farmers respectively.

Sources: *World Bank - <https://data.worldbank.org/indicator/PA.NUS.PPP?locations=KE>, ** WageIndicator - <https://wageindicator.org/salary/living-wage/kenya-living-wage-series-september-2019>, ** This benchmark is a nation-wide benchmark from WageIndicator methodology which means it is not specific to the Mwea region of Kenya. We recognize that this data may not reflect the costs of living in this region, but it has been included as a reference.

Sensitivity analysis on farm business case

Farmer net income is highly sensitive to changes in farmer productivity and farm size

Pre-tax net income in the base year is \$2,978 for the S1 farmer and \$3,783 for the S2. The table below shows **what change to each key variable would result in the farmers attaining the minimum living income of \$6,070** over the same period

Variable	Baseline assumption	S1 required assumption to attain minimum living income (% change)	S2 required assumption to attain minimum living income (% change)
Productivity (bags/acre)	33.8	56.9 (+69%)	49.8 (+48%)
Farm size (acres)	2.5	4.2 (+69%)	3.7 (+48%)
Farm-gate price (\$/kg)	0.75	NM*	1.3 (+71%)
Farm-gate price - Local buyer (\$/kg)	0.68	1.2 (+71%)	1.7 (+147%)

*S1 farmers sells 4% of their produce to MRGM

Assumptions

Key assumptions and background data and analyses

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Farmer segment assumptions

Active farmers have signed agreements with MRGM and can access credit from the Society

Segmentation approach		 Baseline farmer	 S1 – Dormant MRGM member	 S2 – Active MRGM member	
Minimum criteria: <i>Farmers should meet this criteria in order to be eligible for service provision</i>		Organization Farmers must be registered members of the MRGM Society, be rice growers within Kirinyaga county and must own land within the county that can be used for rice farming.			
Segments: <i>Distinct groups of SDM beneficiaries that differ on farm characteristics and/or services received</i>	Characteristics	# seasons	2	2	2
		Main season yield	19.5 bags/acre	26.5 bags/acre	26.5 bags/acre
		Farm size	2.5 acre	2.5 acre	2.5 acre
		Paddy buyer	Local buyer	Local buyer (94%) / MRGM (6%)	Local buyer (63%) / MRGM (37%)
		Farm-gate price (c.)	74.3 KES/Kg	74.3 KES/Kg / 82.8 KES/Kg	74.3 KES/Kg / 82.8 KES/Kg
		Own consumption		0%	
		Post-harvest loss		2%	
	Services	Training	Farmers trained on GAP, financial management and basic health		
		Inputs	None. Farmer can however purchase certified seed from the MRGM shop	Agro-chemicals, fertilizer and certified seeds on cash basis	Agro-chemicals, fertilizer and certified seeds on credit basis
		Mechanization	N/A	Tractors and combined harvesters on cash basis	Tractors and combined harvesters on credit basis
Finance		N/A	Obtains credit for inputs and mechanization from informal sources	Inputs and mechanization services on credit (MRGM), cash advances and welfare loans (Lainisha Sacco)	
	Irrigation	Offered by National Irrigation Authority			

SDM assumptions

Key assumptions for SDM operator analytics

	Segment 1	Segment 2
Exchange rate ¹	106.7	
Scale (# farmers)	4,000	2,000 in 2019 increasing to 4,500 in year 2024
Volumes sourced (MT/year)	960 in 2019 increasing to 2,800 in 2024	8,640 in 2019 increasing to 25,200 in 2024
Loyalty rates (c.%)	6%	63%
Annual paddy and rice price increase	1.25%	
Annual inflation rate	5%	
Farmer training frequency (times/year)	4	
# of tractors (with rotavator & tiller) owned (2024)	19	
# of combined harvesters owned (2024)	10	
# of combined paddy dryers owned (2024)	6	
Portfolio default rate	n/a	1%
Interest cost incurred by MRGM (%)	n/a	14%

Sources: ¹XE

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Glossary

Abbreviation	Meaning
CAGR	Compounded Annual Growth Rate
Capex	Capital Expenditure
COMESA	Common Market for Eastern and Southern Africa
c. / ~	Approximately
EAC	East African Community
FI	Financial Institutions
FY	Financial Year
GAP	Good Agricultural Practices
Govt / Government	Government of Kenya
IT	Information Technology
K	Thousand
KALRO	Kenya Agricultural and Livestock Research Organisation
KES	Kenyan Shilling (currency)
Kg	Kilogramme
KNTC	Kenya National Trading Corporation
LBDA	Lake Basin Development Authority
LF	Lead Farmer
Mn	Million

Abbreviation	Meaning
MoA	Ministry of Agriculture
MRGM	Mwea Rice Gowers Multipurpose Co-operative Society
MT	Metric Ton (1,000 kg)
NCPB	National Cereals and Produce Board
NIA	National Irrigation Authority formerly National Irrigation Board (NIB)
NPBT	Net Profit Before Tax
P&L	Profit & Loss Statement
ROI	Return on Investment
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

Sources

Source	Link (if publicly available)
FAO – Kenya food variability	http://www.fao.org/faostat/en/#country/114
IndexMundi – Rice production in Kenya	https://www.indexmundi.com/agriculture/?country=ke&commodity=milled-rice&graph=production
International Rice Research Institute	https://www.irri.org/where-we-work/countries/kenya
IOSR Journal – Analysis of Millers in Kenya’s Rice Value Chain	https://www.iosrjournals.org/iosr-javs/papers/Vol12-issue1/Series-3/G1201033847.pdf
Kenya Agriculture Climate Smart Agriculture Implementation Framework (2018 – 2027)	https://www.ke.undp.org/content/kenya/en/home/library/environment_energy/Climate-smart-Agriculture-Framework.html
KNBS (2014): Demographic and Health Survey	https://dhsprogram.com/pubs/pdf/fr308/fr308.pdf
KNBS – Economic Survey 2020	https://www.knbs.or.ke/?wpmpro=economic-survey-2020
KNBS – Enhanced Food Balance Sheet for Kenya 2104 – 2018 Results	https://www.knbs.or.ke/?wpmpro=enhanced-food-balance-sheets-for-kenya-2014-2018-results
KNBS – Statistical Abstract 2019	https://www.knbs.or.ke/?wpmpro=statistical-abstract-2019
MAFAP – Analysis Of Incentives and Disincentives for Rice in Kenya	http://www.fao.org/fileadmin/templates/mafap/documents/technical_notes/KENYA/KENYA_Technical_Note_RICE_EN_Jan2013.pdf
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