SDM Analysis KMG & SNV

Public* report

November 2020

*Sensitive and/or competitive information has been removed. This could affect the readability of the public report.

IDH Introduction

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

Chapters in this report

Executive Summary	• States the purpose of the analysis and summary of recommendations • Provides a short description of KMG and an assessment (SWOT) of the current business model that is being implemented in collaboration with SNV
Recommendations	• Proposes a blueprint for the future design of the model • Assesses the performance of the proposed design (improved case) and compares it against the current business model (baseline case)
Context	• Describes the Natural Rubber market and value chain • Analyses the enabling environment and key sustainability risks
Strategy	• Describes the current strategy of KMG and SNV • Details proposed improvements as included in the main recommendations
Annex	• Explains the methodology • States data sources and assumptions (private version only)

Executive Summary | Main question

How can KMG and partners effectively invest in and organize a commercially viable smallholder rubber business model in the Musi Banyuasin and Banyuasin districts, South Sumatra?

- **Kirana Megatara Group (KMG), based in Indonesia, is a front-runner in the production of sustainable natural rubber.** To meet increasing global demand for natural rubber, KMG needs to scale up its operations in a sustainable way. Located near their mills, KMG is sourcing from around 4,000 smallholders in the Musi Banyuasin district in South Sumatra. Together with implementing partners IDH the Sustainable Trade Initiative, Netherlands Development Agency SNV, and Financial Access, KMG is implementing a Responsible Sourcing from Smallholders (RSS) approach, seeking to increase smallholder rubber productivity while preventing the encroachment of peatlands and forests and improving farmer incomes, community livelihoods and local biodiversity.

- **The smallholder rubber value chain in South Sumatra is characterized by** low rubber productivity and quality, limited smallholder access to services and finance, many unorganized farmers, and low transparency due to many middlemen. Low yields are the result of aging trees, poor application of agricultural practices, and low capacity to (re)invest in their farms. Low yields and farmer incomes are driving the expansion of rubber farms, which could lead to further encroachment of peatlands and forests, in turn resulting in increased carbon emissions and reduced local biodiversity.

- **In order to increase smallholder rubber yields sustainably,** farmers need to be trained to apply Good Agricultural Practices (GAP) and Best Management Practices (BMP); become better organized to enable access to services, markets and fair prices to invest in their farms; and become eligible for long-term replanting loans to increase long-term rubber productivity, quality and profitability. However, while benefits are clear and for some services a viable business case exists in theory, it is unclear how the sourcing from, financing of and service provision to smallholder farmers can be most effectively organized and financed, and how long-term sustainability can be guaranteed.

- This analysis zooms in on the question: **How can KMG and partners effectively organize a commercially viable rubber smallholder business model in South Sumatra that ensures increased rubber productivity and quality while simultaneously improving community livelihoods and limiting deforestation?**

Executive Summary | Main recommendations

Ensuring long-term sustainability requires an impactful service package, an efficient supply chain management structure and putting in place key building blocks to enable farmer access to finance

In order to effectively organize a commercially viable smallholder rubber business model KMG and partners would need to:

Prove there is a **shared positive business case** that has a clear incentive for KMG to invest while delivering on envisioned sustainability impacts

- Align around common vision towards with successful outcomes and fair value distribution for investor, trader, and farmer
- Implement a long-term multi-stakeholder strategy with clear roles and responsibilities (KMG, SNV, MFIs, farmer organizations, government)
- Prove a business case exists that is commercially viable for the entire ecosystem while delivering on predefined sustainability targets
- Prove a business case for individual actors investing the value chain exists and where not design incentives to align

Design and implement an **efficient supply chain management structure** that allows for direct sourcing from smallholder farmers in a sustainable way

- Optimize sourcing mix based on sourcing channels' (individual farmers, groups, cooperatives, UPPBs) costs and benefits for KMG and farmers
- Professionalize farmer organizations to enable access to finance, and improve service provision and aggregation efficiency
- Manage a digital infrastructure that collects agronomic, sourcing and farmer financial data for informed decision-making and enabling access to finance

Design and implement an **effective service package** that increases yields, quality and loyalty, improves farmer incomes and mitigates environmental impacts

- Implement an effective farmer segmentation and graduation approach with clear incentives to improve farmer performance over time
- Rollout an effective training and input provision package to increase rubber yields, quality and sustainability
- Design an agroforestry and replanting package with fit-for-purpose loan product that can be made available to farmers in collaboration with local MFI
- Prove how services can ensure sustainable rubber production (avoided degraded lands, additional CO2 sequestered, reduced chemicals)

Executive Summary | About KMG

Being a key player in the Indonesian rubber industry with a proven sustainability track record, KMG is well-positioned to manage a responsible smallholder sourcing program

About KMG[1]

- Founded in 1964, PT. Kirana Megatara is a public listed company since 19th June 2017, responsible from cultivating rubber trees to exporting dry rubber
- They are the largest producer of crumb rubber in Indonesia with more than 18% market share nationally
- Most of their clients are global tire companies, including Bridgestone, Michelin, GoodYear, Pirelli and Continental.
- Their annual rubber production capacity amounts to 720,000 MT

Front-runner in sustainability[2]

- KMG is concerned with the viability of the natural rubber ecosystem, to support the rubber industry and economic development long into the future
- KMG is a front-runner in the production of sustainable natural rubber, for which it has received multiple awards and certificates
- KMG has an extensive sustainability policy in place, through which they critically assess their own operations as well as that of their supply chain partners
- KMG also employs a whistle blower policy to enforce this sustainability policy

Sustainable smallholder sourcing[3]

- Part of KMG's rubber is supplied by smallholder farmers through an initiative called the Responsible Sourcing from Smallholders (RSS) approach
- This diversified supply channel allows them to increase production and mitigate their supply risks towards their buyers and the public
- Through the provision of services to these smallholders, KMG aims to increase the quality as well as the quantity of the rubber, while simultaneously improving the farmers' livelihoods
- These services include training, technical assistance, market access, facilities and infrastructure and several social services
- KMG tests various service provision approaches across regions, including piloting farmer champion incentive mechanisms, rubber replanting and crop diversification

Location of KMG's operations

- Plantations
- Factories

Sources: 1) KMG Website; 2) KMG Sustainability Policy; 3) SURPASS Information Request

Executive Summary | Simplified overview of the Natural Rubber supply chain

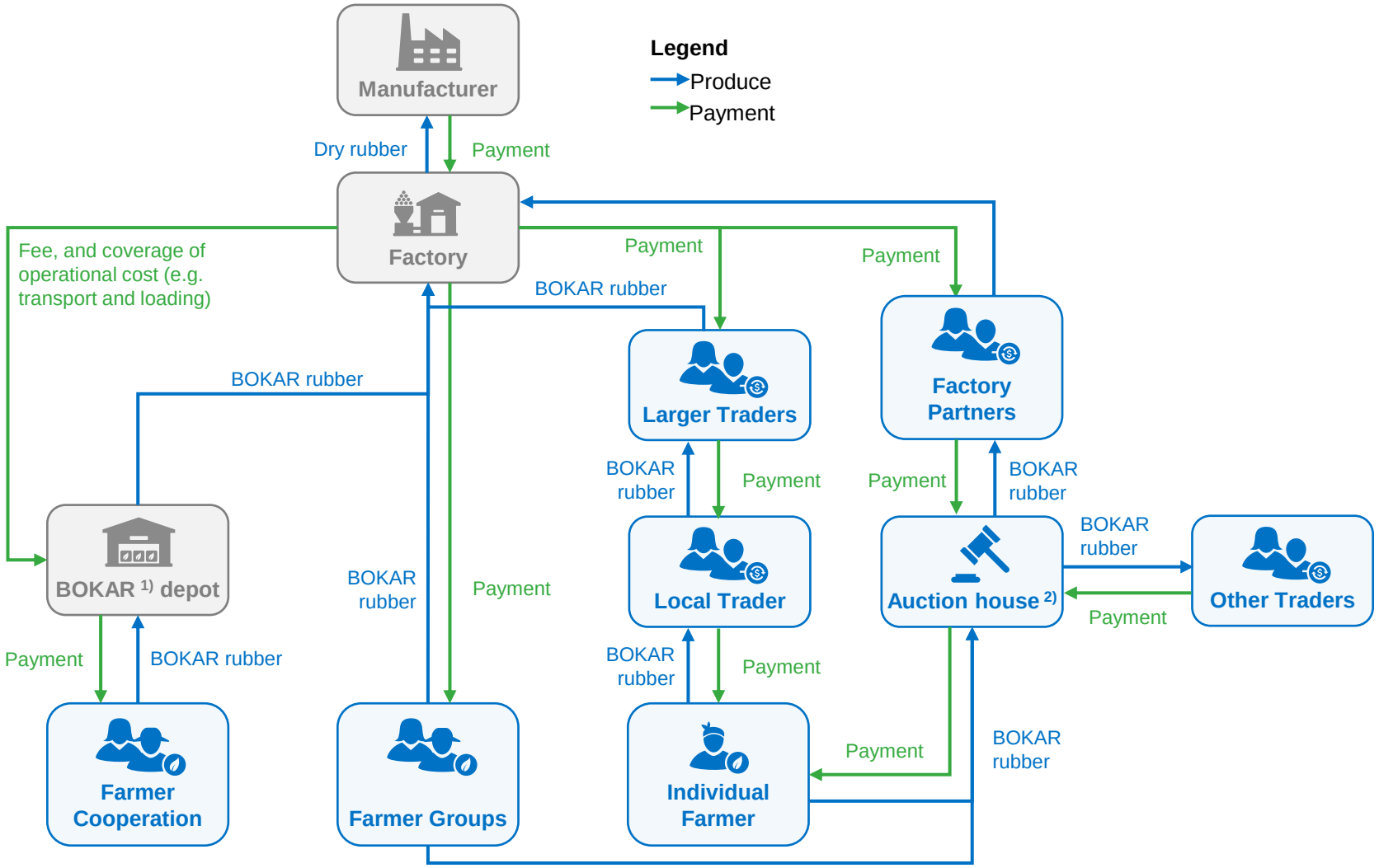
Rubber is a complex value chain with intermediate levels between smallholders and processing factories incentivizing low quality rubber production and creating opacity in price distribution

Rubber sourcing

- Rubber is a complex value chain with intermediate levels between smallholders and processing factories incentivizing low quality rubber production and creating opacity in price distribution.
- Inadequate road infrastructure connecting processing factories to far remote rubber areas leads to a host of sourcing inefficiencies.

Offtake agreements

- Supply chain actors (e.g. offtakers) can provide credit enhancements in the form of corporate guarantees, offtake agreements or a combination of the two. Whereas off-take agreements are common in the oil palm sector, they are limited in the rubber sector. This requires active engagement from the offtaker and lock in partnerships over long time horizons.
- Price and yield fluctuations are additional elements that make drafting and enforcing offtake agreements very challenging.



1.) Pre-processed rubber with DRC of 40 to 65%

2.) Both UPPBs and Cooperation function as an action house

Executive Summary | External opportunities and threats analysis*

KMG can leverage its sourcing infrastructure, sustainability efforts and existing partnerships. Embedding sustainability and access to finance into a complex value chain is the main challenge.

Legend: **Economic** | **Social** | **Environmental**

External

Helpful	Harmful
Opportunities	**Threat**
• There is an increasing global demand for sustainable natural rubber.	• Unlike palm oil, rubber can be stored for months, increasing the risk for side selling and speculative trading.
• There is an increasing pressure to expand rubber consumption for domestic use, particularly in non-tire sectors.	• The value chain structure is complex, and farmers are poorly organized.
• There is a trend of positive flows of foreign investment in setting up tire manufacturing in Indonesia over the past several years.	• Financial institutions are unwilling to invest in the farmers/value chain.
• There are about 700,000 hectares of old, non-productive rubber trees that can potentially be replanted with new generation high-yielding clones to compete with other rubber producing countries.	• Rubber prices are volatile and have been declining in recent years.
• Intercropping allows KMG to expand into other crops, growing and diversifying its revenue streams.	• Processed rubber by KMG that is cultivated in an unsustainable manner might not fulfil the (increasingly strict) requirements from end buyers.
• Trend of SLL (Sustainability-Linked Loan) business as option for processing and plantation industries that ties in with ESG performance.	• Smallholders' income is highly dependent on rubber due to a limited extent of diversification.
• Woman play a primary role in intercropping. Hence, training on intercropping to woman might help smallholders to ensure a living income.	• Poor infrastructure makes it difficult and costly to reach smallholders directly.
• Islamic banks do not use fixed interest rates but relate the return to profit. Hence, different finance instruments could be established.	• The average age of rubber farmer is increasing and there is limited interest from children to take over.
• Rubber farms are eminently suitable for agroforestry. Intercropping food crops can improve a farmer's cash flow, increase food security and increase resilience.	• Potential social conflict arise from the lack of solution on illegal tapping or claims by smallholders on rubber trees located within forest concession areas.
• Agroforestry increases biodiversity and has a higher CO2 uptake than monoculture rubber plantation. If KMG has science-based targets they can monetize CO2 credits and/or claim impact against targets.	• Complaints/litigations brought about by CSOs on social issues
	• Climate change causes rising temperature and increasing intensity of rain peaks which decreases the already low yield of rubber trees.
	• Due to the lack of performing GAP and BMP, smallholders expand their existing plantations in times of sustained high prices, endangering forests and peatlands and increasing the potential for wildfires.

**The Strength and Weaknesses analysis has been removed as it contained competitive information.*

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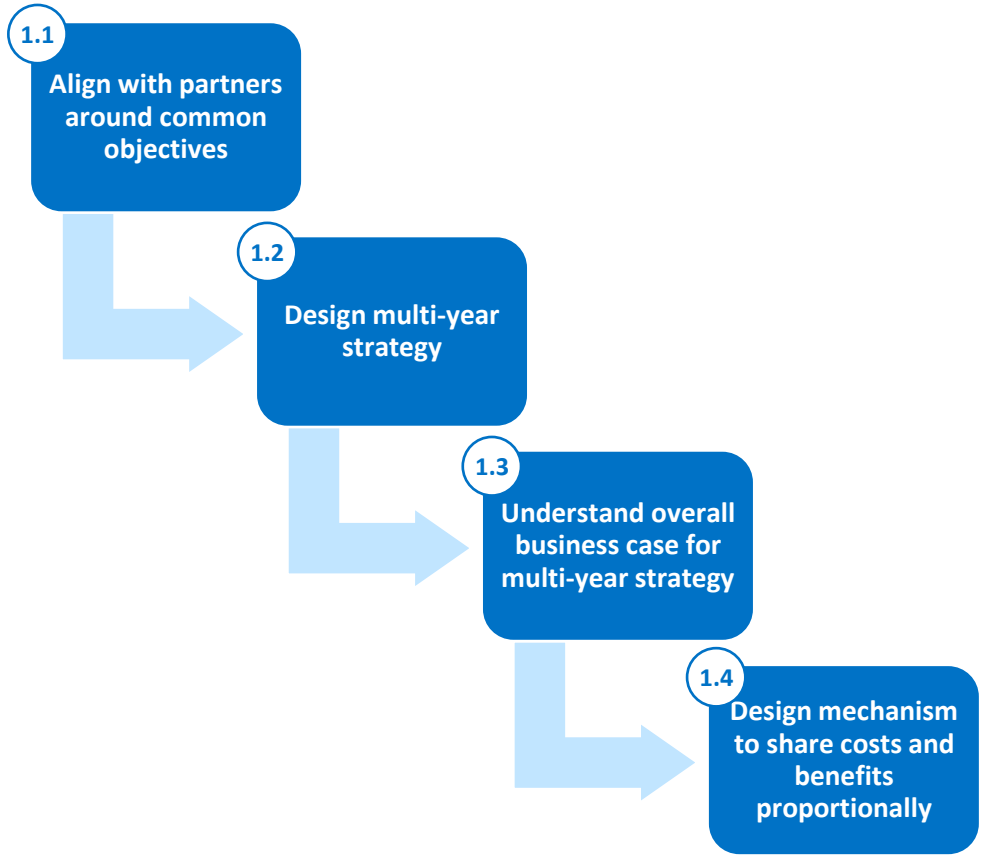
Introducing the projected baseline and improved business case scenarios

The business case projections included in this Recommendation section distinguish a baseline and improved scenario. The **baseline scenario** is the result of scale, cost and revenue assumptions following the design of the on-going project of KMG and SNV. The **improved scenario** assumptions follow from suggestions for improvement brought up by KMG, SNV and the IDH Farmfit team during this SDM analysis. These improvements have been included in the financial modelling to the extent some clarity on their design exists. On many aspects there appears to be **too little common understanding of the future business model design**. In that case no costs have been modelled, rather qualitative recommendations for the design of these elements have been provided throughout this report.

Activity	Baseline scenario *Current project discontinues*	Improved scenario *Long-term strategy gets implemented*	Not modelled because of too much unclarity *Strategic topics to be discussed and designed*
Strategy & scale	• Assumes discontinuation of most services after 2021 • Assumes slow farmer scale up	• Assumes faster farmer scale up and graduation	• No long-term strategy among partners exists • Unclarity about service sequence
Data and M&E	• Includes basic data infrastructure and personnel costs	• No change in assumptions	• No clarity about future development costs and responsibility of data infrastructure
Sourcing	• Includes rubber sourcing volumes (no alternative crops such as turmeric)	• Increased sourcing volumes due to additional farmers and improved yields and quality	• Alternative crop volumes not projected as these were out of scope
FO capacity building	• Assumes capacity building discontinues after 2021	• Includes cost of on-going capacity building • Includes cost of financial service provision	• No long-term strategy about FO capacity building and role of FOs
Training	• Assumes training discontinues after 2021	• Includes cost of on-going training by implementing partners	• No clarity on who provides service and bears costs
Inputs	• Ad-hoc input provision, only provided to replanting farmers	• On-going input provision for all segments	• No clarity on who provides service and bears costs
Financial products	• Some inputs (see above) provided on credit	• Assumes increased input credit volumes (see above) and corresponding costs and revenues	• No clarity about loan products and finance providers
Replanting & Agroforestry	• Includes costs of future bi-annual replanting and agroforestry pilots	• No change in assumptions	• No clarity on who provides service and bears costs, nor on farm-level impact

1.0 Recommendations

KMG should prove there is a shared positive business case that provides a clear incentive to invest while delivering on envisioned sustainability impacts



1.1 Recommendations | Shared positive business case

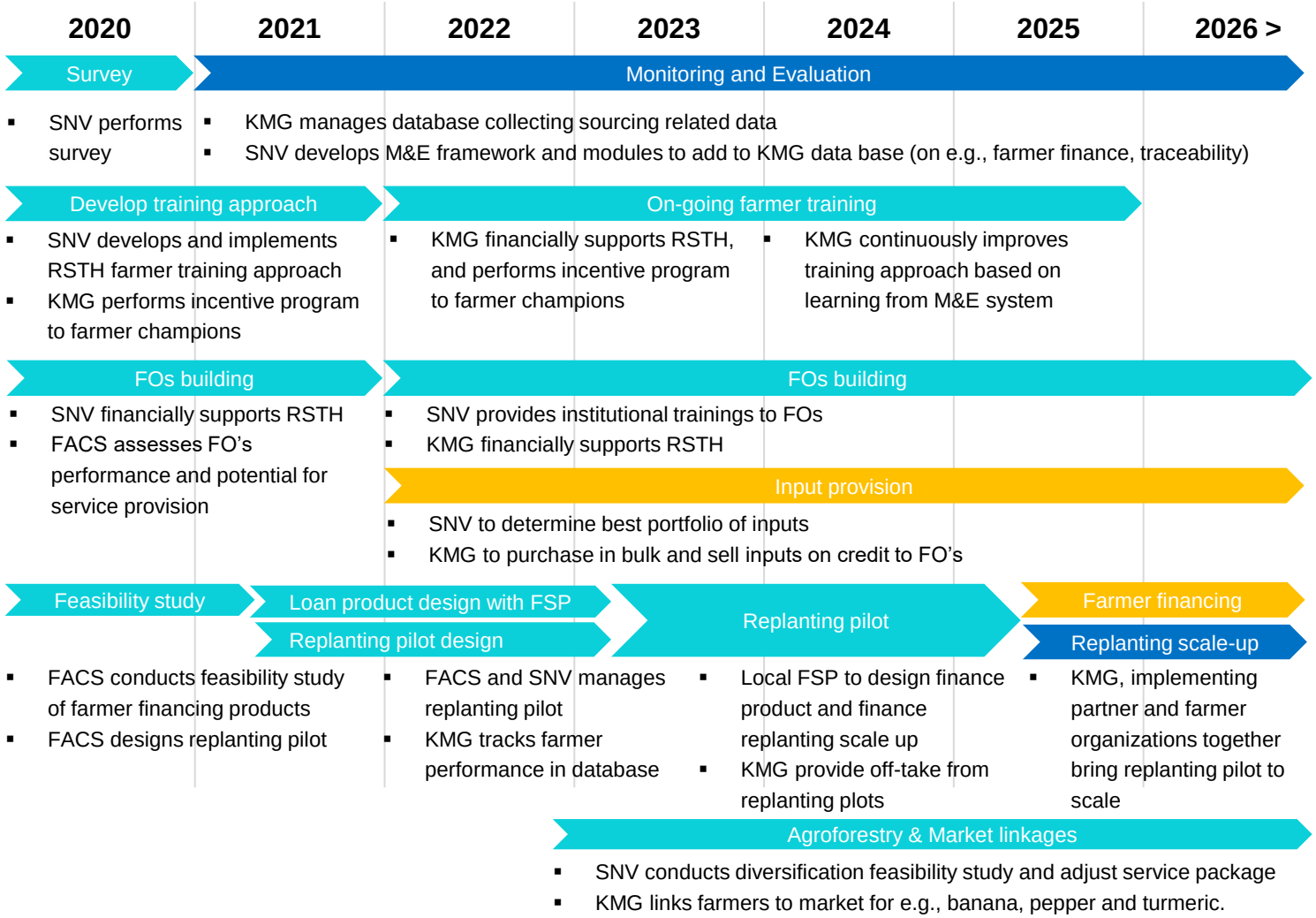
KMG and partners must align behind commonly shared long-term strategic objectives. While coming from different angles, clear opportunities for co-investment exist due to significant overlap

Strategic objectives	KMG *Supplying high quality rubber in a profitable and sustainable way*	Public sector *Ensuring sustainable production, forest protection and social inclusion*	Impact investor(s) *Improving rural livelihoods, protecting and restoring forests, and ensuring sustainable agricultural production*
Increase smallholder rubber yield *Through training, input provision and replanting and M&E*	• Increased sourcing volumes to meet growing international demand • Reduced costs through improving procurement efficiency	• Improved rural livelihoods due to higher revenues • Reduced competition for land due to increased land productivity	• Increased farmer incomes • Reduced pressure on land
Improve smallholder rubber quality *Through direct sourcing, training and input provision and M&E*	• Improved processing margin through higher DRC and smaller share of contaminated rubber	• Improved rural livelihoods through higher rubber sales prices	• Increased farmer incomes • Decreased pollution
Improve smallholder livelihoods *Through direct sourcing, farmer organization, training, input provision, replanting, diversification, rubber agroforestry system technique, access to finance and M&E*	• Increased sourcing volumes and procurement efficiency through increased farmer loyalty • Reduced risk of reputational damage	• Improved rural livelihoods due to higher incomes, smoother cash-flows and alternative revenue streams • Reduced risk of deforestation due to less slash-and-burn farm expansion	• Increased farmer incomes • Growing market for rural and agricultural financial products • Reduced investment risk due to fewer farmer defaults
Protect and restore surrounding lands *Through training, replanting, diversification, access to finance and M&E*	• Compliance to national legislation • Compliance to increasingly stricter international sustainability standards • Meet buyer demands • Reduced risk of reputational damage • Unlocks external public sector funding and/or affordable finance	• Reduced land degradation • Increased biodiversity due to shift to agroforestry	• Reduced land degradation • Growing portfolio of green agricultural investments

To assessment of current services

1.2 Recommendations | Shared positive business case

A multi-year, multi-stakeholder plan with clear roles and responsibilities should be drafted. KMG should facilitate and co-fund services designed and provided by implementing partners and FOs



Design considerations

- This overview shows a proposed set of services and activities required to meet the outlined strategic objectives
- The suggested service design is based on an assessment of the existing plans for service provision
- Activities are color-coded based on which actor is best positioned to be managing it
- Due to the complex value chain and service provision not being KMG's core competence, KMG is advised to not organize service provision itself, yet should rely on implementing and financial partners for service design and roll-out
- Next to off-taking, processing and selling, KMG has a critical role to play, not in implementing, but in facilitating service provision, most notably by managing the data infrastructure, setting clear incentives, and linking farmers with service providers
- Sequencing is key as the success of certain activities is conditional on the outcomes of other services (e.g., replanting finance requires trained farmers, capable FO's and farmers with financial track record)

Type of actor most strongly positioned for driving the activity

KMG	Implementing partner(s)	Farmer Organizations

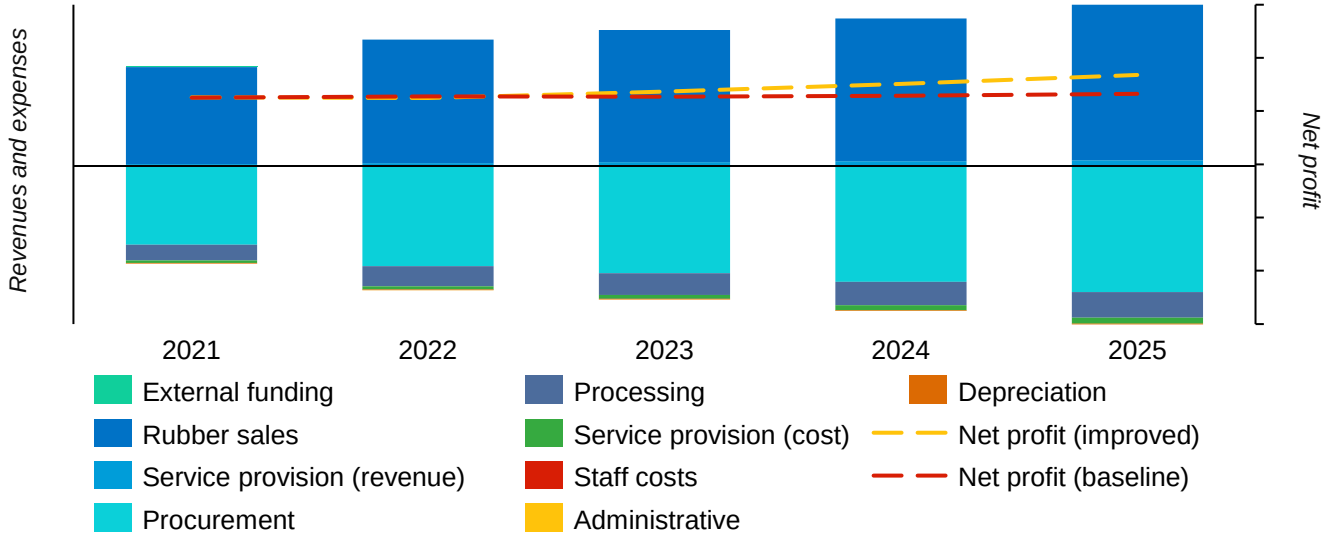
To scenario assumptions

1.3 Recommendations | Shared positive business case*

In a proposed improved scenario where more investments are made, the SDM as a whole performs better financially (+27% net profit), as well as in terms of certain important sustainability parameters

Improved P&L of the SDM for all partners

P&L including KMG and SNV operations in Musi Banyuasin.



Outcomes per scenario by 2025

Delta between Baseline and Improved scenario on indicators of the SDM analysis.

	Farmers trained	Rubber sourced directly (Mt)	Percentage of total rubber sourced (%)	Average farmer income (USD)	Cumulative expenses	Carbon stock of farms in value chain (CO2eq)
Baseline	10,147	18,800	59%	1,023		474,880
Improved	30,147	23,800	75%	1,113		1,362,189
Difference	+197%	+55%	+16%	+9%	+29%	+187%

Commercial viability

Existing service provision efforts should be continued, strengthened and expanded. A clear business case exists as additional costs can be covered through additional revenues made within the ecosystem.

- Annual service provision variable costs make up only between 2-4% of total cost of sales
- Currently no external funding for 2021-2025 is secured
- Service provision is expected to increase sourcing volumes and quality leading 27% EBITDA growth by 2025

To meet above financial and sustainability targets it is required that:

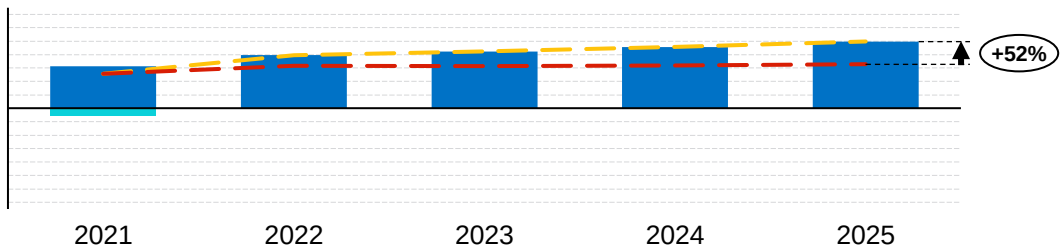
- A cost-sharing agreement is made between KMG and partners
- KMG and partners continue and strengthen current service provision efforts started in 2017, and ramp up efforts on M&E, FO strengthening and input provision
- The replanting pilot is further thought trough and only implemented when other key services are in place first (strong training approach; monitoring of financial track records; FO's as service providers)

Sensitive and/or competitive data have been removed.

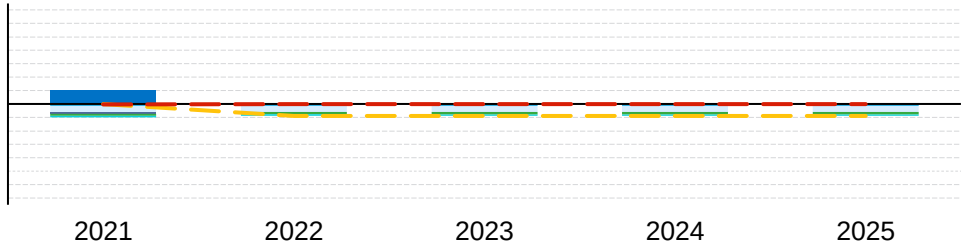
1.4 Recommendations | Shared positive business case*

In order for this improved scenario to succeed, all entities involved should be aligned on the required investments and commitment, and the distribution of the resulting created value

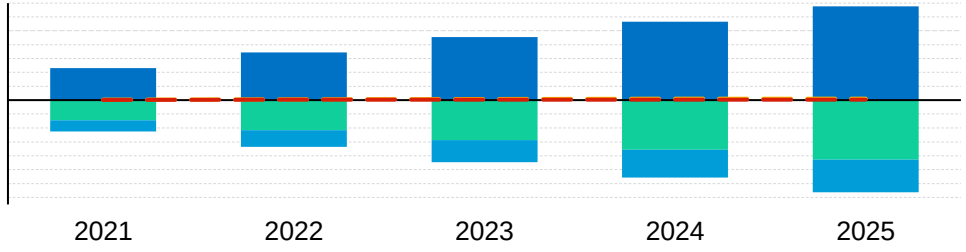
KMG P&L



SNV P&L



FOs P&L



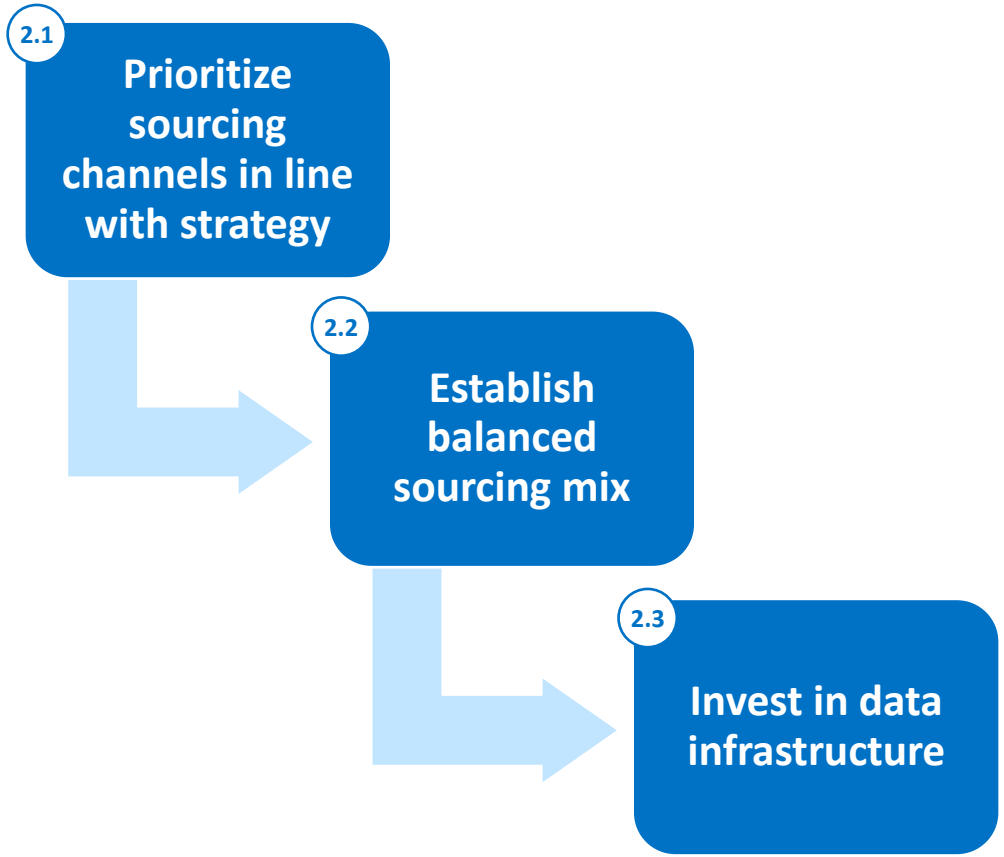
Cost-sharing

- While the costs of service provision are primarily borne by implementing and financial partners, the additional revenues as a result of increased yields and quality, and improved efficiency are primarily incurred by KMG and farmers.
- With the intention of operating a commercially viable and self-sustaining SDM, KMG and current and/or future partners should create a cost-sharing agreement to cover the cost of on-going service provision, paid out of additional revenues made by KMG.
- This agreement should recognize the interdependencies between the combined strategic objectives and each stakeholder's core competencies, limitations and position in the value chain.
- Progress against predefined performance targets of implementing partners would need to be continuously monitored and evaluated to ensure effectiveness of service provision.
- FO's, once assessed, mapped and trained, will be serving as providers of input and financial services. They cover their operational costs (management fees, warehousing and logistics) by charging a break-even margin on products sold. They don't charge an additional commercial margin, so the prices for farmers will be lower.

Sensitive and/or competitive data have been removed.

2.0 Recommendations

Design and implement an efficient supply chain management structure that allows for direct sourcing from smallholder farmers in a sustainable way



To description of sourcing channels

2.1 Recommendations | Efficient supply chain management structure

In transitioning to a larger share of direct sourcing (to control yields and quality and meet increasing demands for transparency), KMG is advised to establish, strengthen and source from farmer groups.

	Intermediaries	Direct sourcing		
		UPPBs	Coops	Farmer groups
Most desirable channel if KMG…	…is seeking to keep costs low with limited transparency	…is seeking increased traceability, sourcing efficiency and indirect control over farm yield and quality	…is seeking increased traceability, sourcing efficiency and indirect control over farm yield and quality	…is seeking traceability and most direct control over farm yield and quality, while willing to invest
Conditions for success	• Middlemen fulfill aggregation and service provision functions • Good relationships with middlemen	• Well-functioning FOs • Investment in service provision • An MoU needs to be in place to ensure loyalty	• Well-functioning FOs • Investment in service provision • Having an MoU in place to ensure loyalty • Professional coop leaders	• Well-functioning FOs • Investment in service provision • Collaborate with partners to provide services
Sourcing share	25.8% (2020) 23.7% (2025)	0.0% (2020) 0.1% (2025)	12.2% (2020) 12.2% (2025)	61.1% (2020) 63.2% (2025)
KMG	+ No to low involvement needed + Aggregation by middlemen reduces logistical costs - No control over quality - No control over quantity - Lack of traceability	+ Strict requirements leading to higher DRC + Potential to play a role in service provision - Prices are higher and unstable - No guarantee to win the auction	+ Potential to play a role in (financial) service provision + Increased loyalty + Large quantities leading to economies of scale - Farmer engagement and provision of services is required	+ Higher transparency and thus traceability + More influence on quality + Increased loyalty - Risks (like quality) now lay with KMG - Farmer engagement and provision of services is required - Relatively small quantities provided
Farmers	+ Direct or advance payment + Lower quality requirements + Transport is organized by middlemen - Unclear and unfair pricing - No proper valuation of quality - Lower incomes	+ Higher price + More transparency - UPPBs charge a fee for each Mt sold - Dependent on auction dates to sell - Quality requirements	+ Higher price + Pricing based on quality + More transparency - Quality requirements - Membership fee	+ Higher price + Pricing based on quality + More transparency - Quality requirements

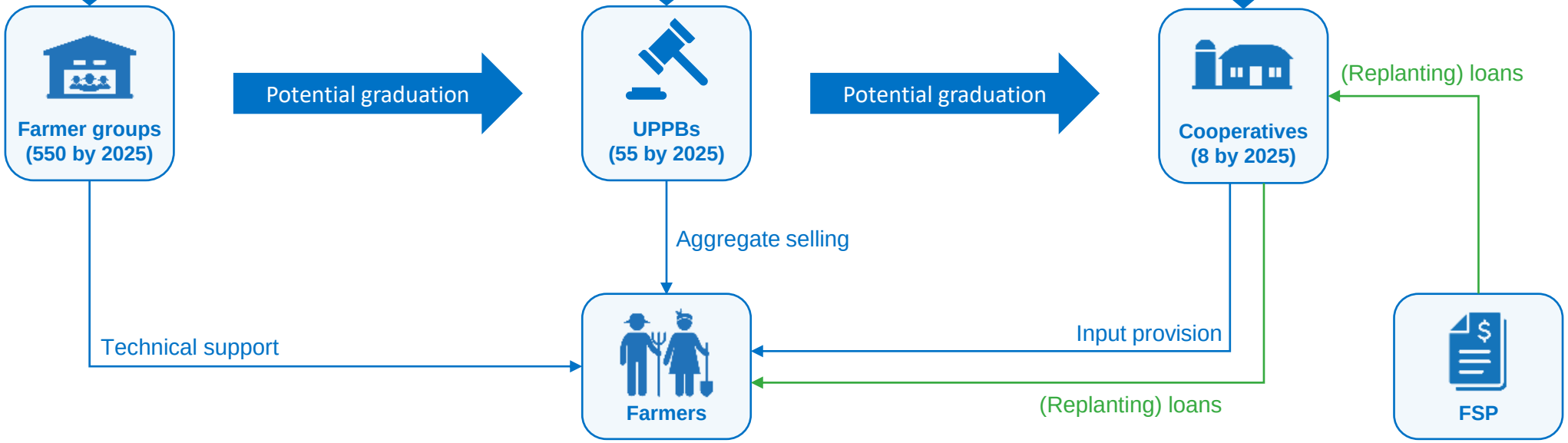
2.2 Recommendations | Efficient supply chain management structure

In order to enable aggregate selling, financial services and input provision, a clear farmer organization strategy must be designed and implemented by KMG and SNV

- SNV supports farmers with establishing farmer groups and strengthening existing ones, by providing institutional trainings and organizational support
- Farmer groups focus on the technical side of rubber farming

- Farmer groups with potential can grow into a UPPB to expand their activities to collective selling
- SNV supports this service expansion by helping with creating a business model and assessing capital requirements

- Well-performing UPPBs can receive further support from SNV to grow into farmer cooperatives, further expanding their activities to include input provision and ultimately finance channelling
- FACS is conducting a study to assess and map the maturity and professionalism of the existing farmer cooperatives



To detailed outcomes of DTA

2.3 Recommendations | Efficient supply chain management structure

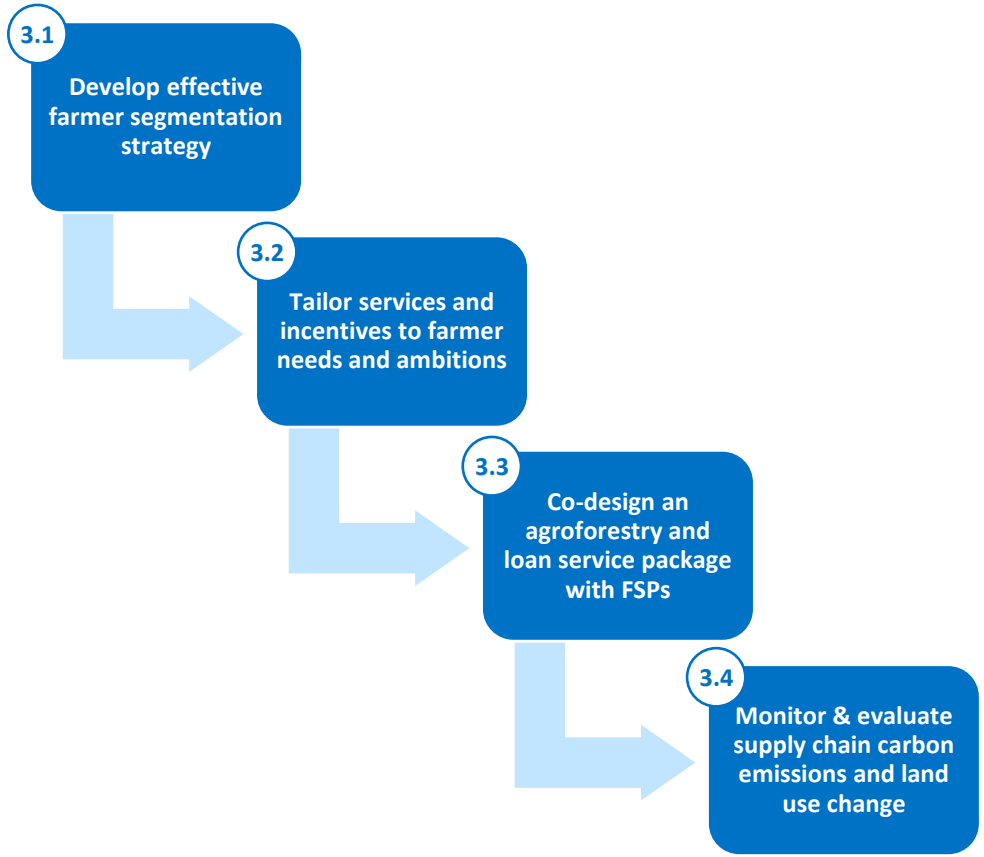
KMG should prioritize the extension of the scope of their app. By collecting more data (and acting upon that data) KMG can overcome most of the challenges they currently face

The Indonesian rubber value chain is highly complex, fragmented and opaque, which leads to inefficiencies. Due to a lack of traceability and transparency, requirements from end buyers can not always be met. KMG is currently developing an application (Rubber Notes), but further and more comprehensive digitization is needed to reach the SDM's strategic objectives.

Objective	Current challenges	Proposed solution
Guaranteed transparency throughout the value chain for end buyers	• KMG collects data at the FC level, but limited farm level data is collected (e.g. on input usage, yield, income, soil, tree density) • Limited to no visibility on the farmer and source of production	• KMG's should expand the scope of their app to collect deeper data on the direct-sourcing channel. This can improve traceability and contribute to building the direct-sourcing channel strategy • This could be a stepping-stone to creating a traceability platform and could later also be integrated with advanced tracking elements such as tree sensors, remote-sensing data and geo-tagging. KMG can explore the option to do this through a partnership • KMG should leverage the internal IT and application development team to create the first upgraded iteration of the app. In the advanced iterations, an external vendor could be contracted.
Understand effectiveness of service provision	• No data is collected on input usage, cultivation practices and yields, and how these variables relate to one another	• KMG should focus on exploring digital solutions for the farms and farmers including advanced mapping (remote sensing) of tree growth areas, real-time monitoring of tree health and yield (via sensors). • The additional and improved collected data can be used for planning long-term yield and earning projections with farmers and for offering a package of services suited for the farm
Capture farmers' financial track records	• No financial data or commercial performance data is collected at farm level	• The expanded scope of KMG's app should include data collection on financial and commercial performance of the farmers they source from • This data can inform KMG and FSP's on a farmers eligibility for (replanting) loans and the corresponding risks
Optimization of logistical processes	• KMG's 15 plants are linked through an SAP system and their value-chain operations are digitally monitored, but only from the moment rubber arrives at the plant	• The expanded scope of KMG's app should include data collection on (the timing of) production, aggregation points and transport & logistics • This data can be used to optimize their processes and reduce costs

3.0 Recommendations

Design and implement an effective service package that increases yields, quality and loyalty, improves farmer incomes and mitigates environmental impacts



To detailed segment descriptions
To assessment of current approach

Recommendations | Effective service package 1/4

Implement an effective farmer segmentation and graduation approach with clear incentives to improve farmer performance over time

An effective farmer segmentation approach:

- Is embedded into the organizations' strategy and operations
- Introduces a clear and useful terminology that aligns people intra- and interorganizational and can be used for decision-making
- Has a clear graduation strategy, linked to progressive incentives, sourcing benefits and service packages
- Defines measurable and relevant performance indicators (e.g., yield, inputs used, costs of production) per segment
- Defines segments that are representative of farmers in the field

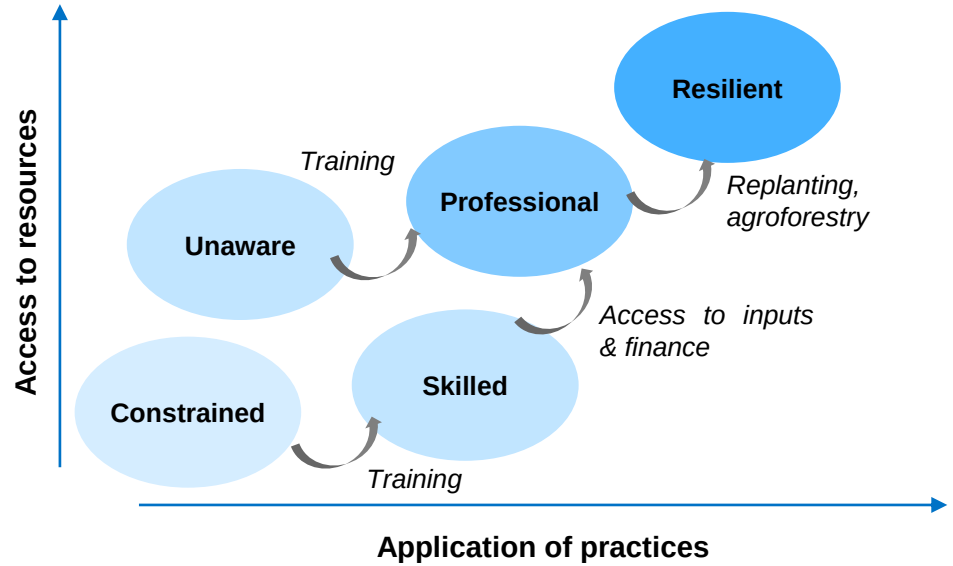
Successful implementation would require KMG, SNV and partners to:

- Agree on a mutually understood and workable segmentation approach
- Raise awareness within their organizations and ensure adoption of the approach
- Integrate the approach into processes where KMG, SNV and partners collaborate, e.g.: use criteria to select farmers, build a service package around segments, add performance indicators to farmer database to be tracked over time

The following set of minimum criteria and farmer segmentation approach are recommended:

Minimum criteria for a farmer to be eligible for direct sourcing and service provision	
Willingness to join	To ensure effectiveness of investment in training farmers, only those willing to supply the majority of their rubber to KMG are able to join
Risk appetite	To ensure farmers will invest in their farms and taking steps to graduate from one segment to the next, farmers should have above average willingness to take risk
Distance to HCV	To reduce the risk of sourcing from areas with a high probability of encroachment on peatlands and forest, farmers near HCV areas will not be sourced from

Farmer segmentation approach

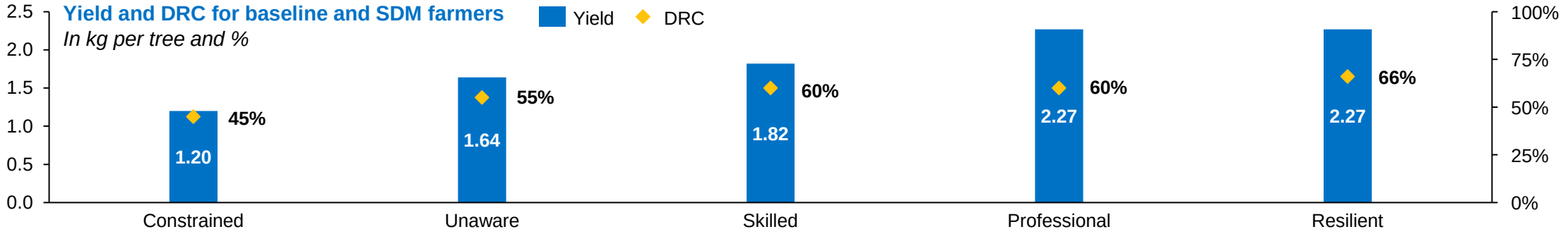


- When farmers are eligible for service provision they are registered into a database and grouped into one segment (based on performance criteria)
- Services are tailored to the farmer's needs
- Performance will be tracked over time and farmers incentivized to graduate to high-level segments
- Meeting certain performance criteria, farmers can graduate and receive more advanced services

To service design
To detailed farmer P&Ls

Recommendations | Effective service package 2/4

To optimize farmer performance, the current training incentives should be sharpened both for Farmer Champions and farmers, and access to high-quality inputs should be ensured



Training

- Currently 100 FCs are trained each year of which 50% eventually become an FC. FCs subsequently train 4 groups of 25 farmers. This is a one-time training at a cost of USD 10 per farmer. 50% of these trained farmers will end up being organized into groups and supplying directly to KMG's factories
- FCs are only incentivized based on the quantities that farmers supply to KMG, not on quality or number of farmers reached
- This light touch training approach is inadequate to obtain they necessary results and sufficiently contribute to the SDMs objectives
- To improve the effect of these trainings, FCs as well as farmers should have the right incentives in terms of quality and sustainability as well as quantity (e.g. in the form of premiums for certain DRC or contamination levels)
- This is only feasible if there is full transparency (as a result of a digital data system) and end buyers are willing to pay a premium for this

Input provision

- Furthermore, the effect of trainings can be improved further by ensuring access to high-quality inputs at affordable prices
- Farmer groups and/or cooperatives can play in important role here with the support of KMG, conditional on the fact that farmer organizations are sufficiently strengthened

Farm-level impact

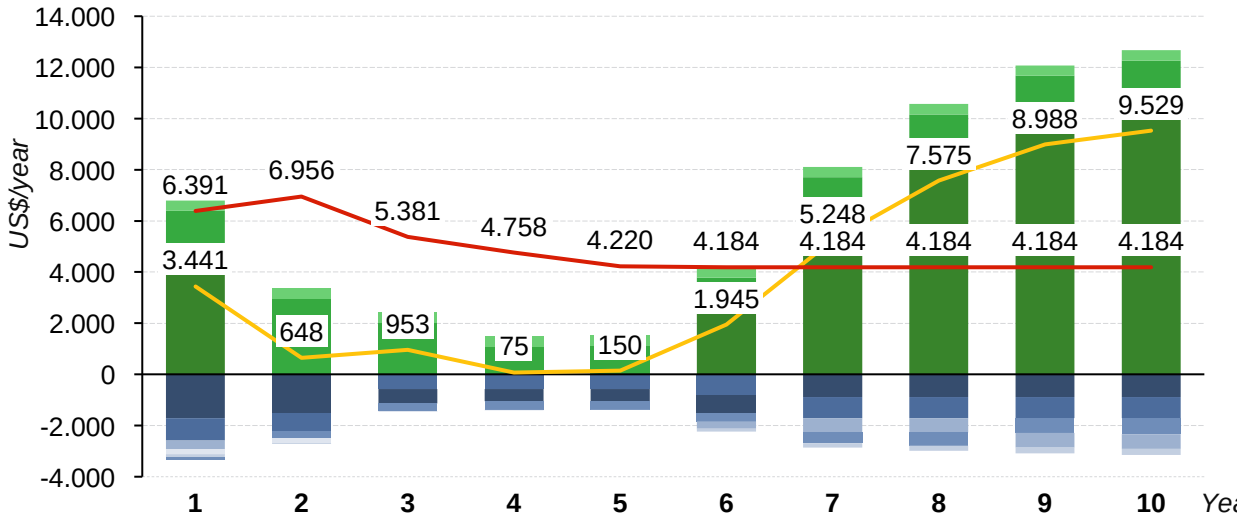
- Efficient training and input provision can increase a farmer's yield with 39-52% and boost the average dry rubber content with 5 to 15 percentage points, positively impacting the farm P&L
- Since the effects are evident, both training and input provision should be a structural component of this SDM

Recommendations | Effective service package 3/4

Design an agroforestry and replanting package with fit-for-purpose loan product that can be made available to farmers in collaboration with local MFI

Comparing net income of Professional and Resilient SDM farmer.

Resilient income split in revenue and cost (USD/year) compared to Professional net income.



4,970	-	-	-	-	2,138	5,396	7,438	8,690	9,186	**Annual yield (kg)**
1,443	2,083	2,197	2,192	2,071	2,425	3,109	3,687	4,091	4,321	**Loan outstanding (USD)**
-	289	763	1,355	2,065	2,892	3,666	4,547	5,602	6,831	**Loan repayment (USD/cumulative)**
108	373	694	1,023	1,343	1,680	2,095	2,605	3,188	3,819	**Interest payment (USD/cumulative)**

Net Income (Resilient)
Net income (Professional)
Revenue other revenue
Revenue other crop
Revenue rubber
Labor cost
Input cost
Financing cost
Equipment cost
Other cost
Replanting cost

Discussion

Well-performing farmers that are willing and able, with a proven track record can be eligible for a replanting package.* Replanting is only feasible if:

- Markets for proposed intercrops (e.g., banana, pepper and turmeric) exist
- Rubber prices at least stabilize and increase in near-future
- A suitable and affordable finance product competitive to loans provided by middlemen will be made available and accessible to farmers – currently researched by FACS
- A channeling mechanism is designed and implemented with the right set of actors:
  1. KUR can be used by state-owned-banks to provide loans to farmers
  2. Direct to farmer organizations, based on maturity assessment (financial, governance, experience), receive financing from impact investors
  3. Existing banking partners of KMG can provide credit enhancement via off-take agreements

Next steps on designing suitable and affordable loan products and feasible financing and delivery mechanisms are taken by KMG together with FACS and SNV.

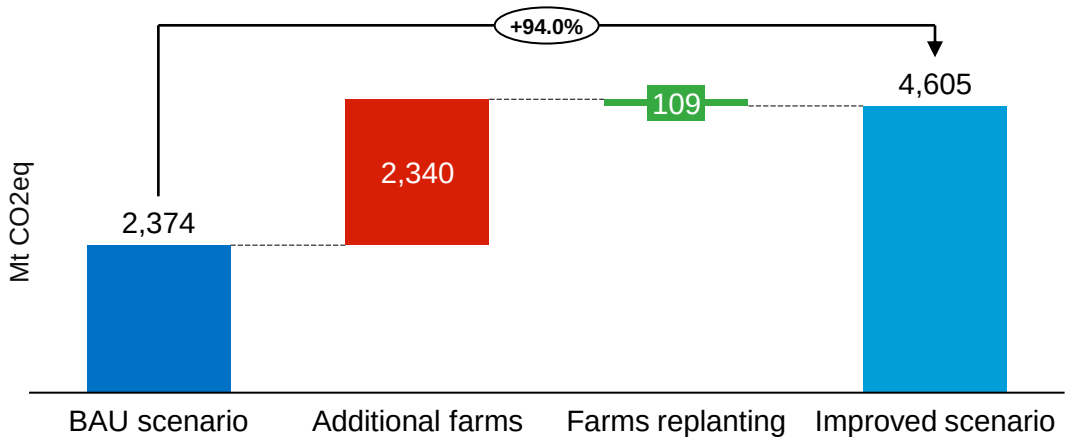
* This replanting regime follows the 100% replanting with intercrops scenario recommend by a study conducted by FACS, performing better than scenarios with staggered replanting or no intercrops.
** Labor cost in year 1 and 2 of the resilient farmer are high compared to 7 – 10, as result of labor cost for replanting (land preparation and planting)
*** Net income of the Professional farmer is declining over the years, due to aging threes without replanting.
**** Resilient farmers do not have rubber revenue in year 3 – 5 but earn cash from intercrops
***** After the sixth year, the replanted rubber trees produce more latex and as a result the Resilient farmer's net income exceeds the net income of Professional farmers.

To underlying assumptions

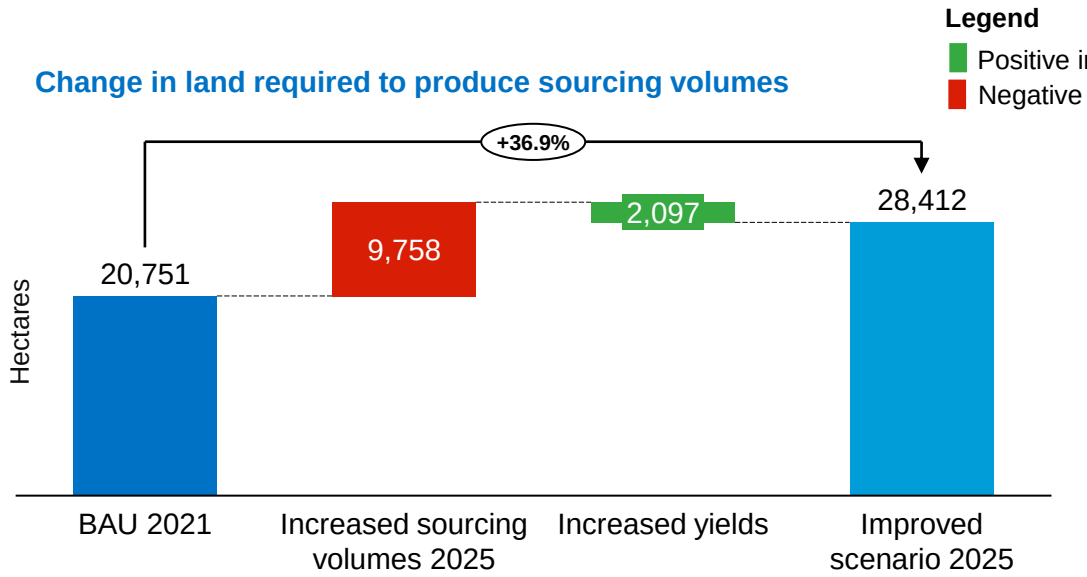
Recommendations | Effective service package 4/4

Prove how services can ensure sustainable rubber production (avoided degraded lands, additional CO2 sequestered, reduced chemicals)

Change in carbon stock added to KMG scope* between 2021-2025



Change in land required to produce sourcing volumes



Increased carbon stock within scope of operations by adding farms to direct sourcing channel

- Above figures show the total estimated* volume of CO2eq stored in the above-ground biomass of the plantation, coming within direct scope of the SDM. Farms already exist, but it is currently unclear whether already part of KMG supply chain
- Comparing the Business As Usual (BAU) scenario with the improved scenario the carbon stock in scope grows with 2,340 Mt (valued at €56,000**) a result from more farmers entering the direct sourcing supply chain. 109 Mt carbon (costing €2,608) gets released where farmers are replanting their 15-25 year old farms
- The net positive carbon stock change due to replacing monoculture with jungle rubber is only materializing on the long term, when the newly planted rubber matures

Increased pressure on land

- Above figures show the total land required to produce the target volumes from direct sourcing (17,000 Mt in 2021; 23,500 Mt in 2025)
- While growing rubber demand puts additional pressure on land (+9,800 hectares), increased yields (827kg/ha versus 770kg/ha) reduce that pressure with 2,000 hectares by 2025. Note that the 2025 yield figure includes 1,300 hectares that undergo replanting, where trees are not yielding before 6 years since planting
- Another key driver reducing pressure on land is the Dry Rubber Content as share of the Natural Rubber delivered to KMG factories
- To further improve the sustainability of the SDM, additional investments in improving yield and DRC% are required

* Carbon counted to KMG operations. Change does not imply actual carbon change, as farms already exist
** Calculations based on CO2eq value per age of farm and CO2eq uptake for different rubber farming systems
*** Average 2020 price for carbon permits following https://ember-climate.org/data/carbon-price-viewer/

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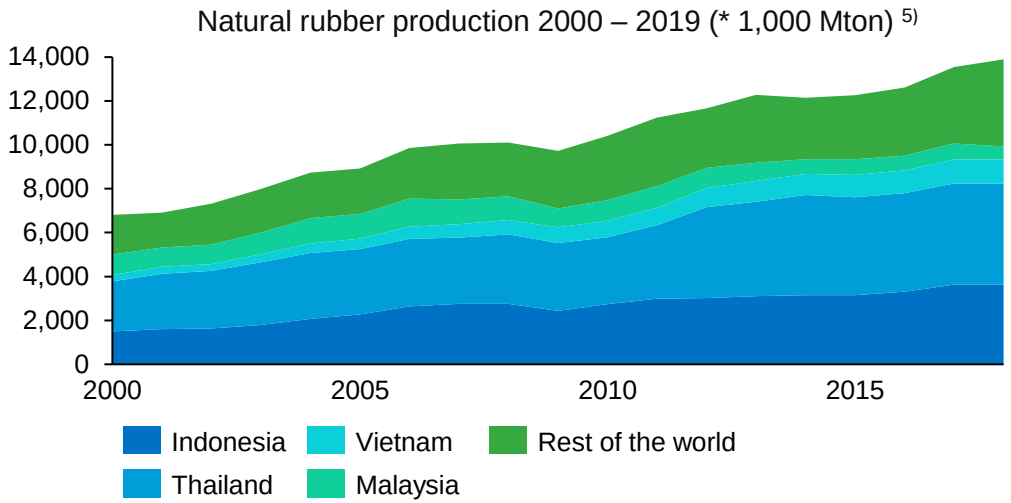
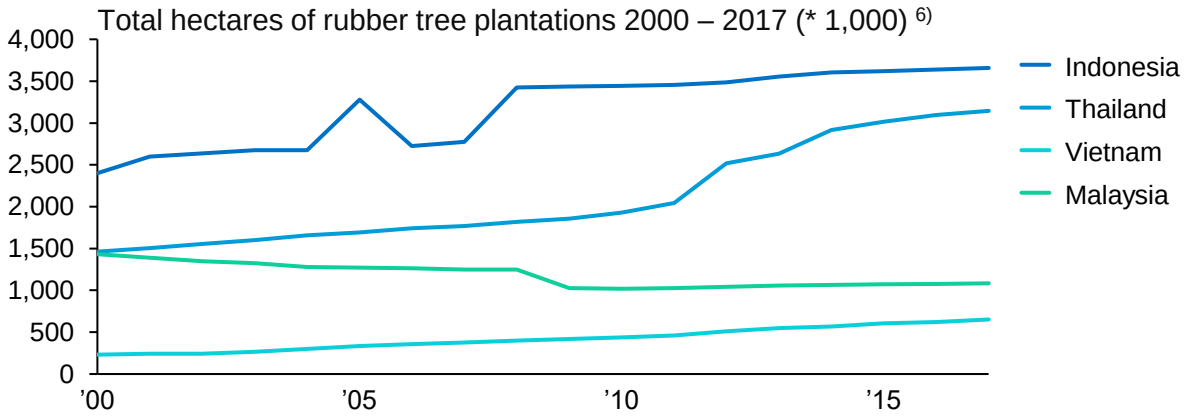
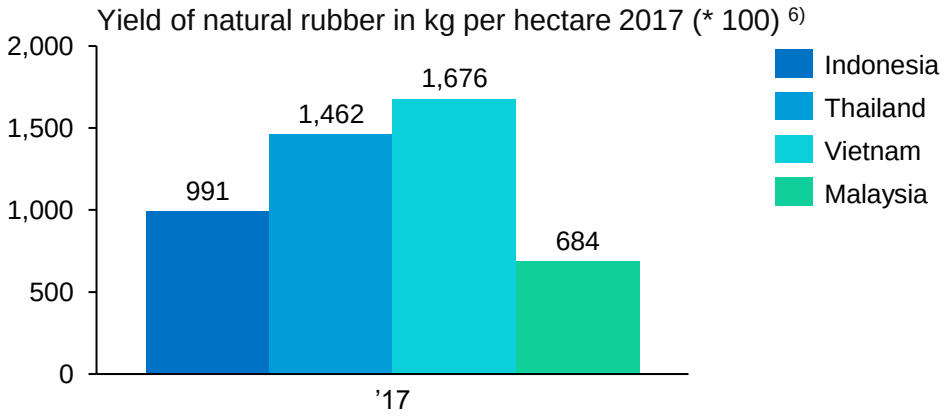
Global natural rubber production



Characteristics of NR production

- Of total NR production, close to 80%, is produced by four leading countries, of which Thailand and Indonesia each produce up to 30%, and Vietnam and Malaysia each close to 10%
- Compared to the other leading NR producing countries (Thailand and Vietnam), Indonesia has a low level of productivity per hectare, which is similar to Malaysia. This is due to the overall older rubber trees in combination with low investment capability of the smallholder farmers in quality cultivation methods.[1), 2) & 3)]
- In 2009 - 2011, Thailand and Indonesia increased the area of their natural rubber plantations in reaction to a price peak in 2010 – 2011. In Sumatra, the primary growing area of Indonesia, smallholders currently produce roughly 82% of rubber yields on this area.[4)]

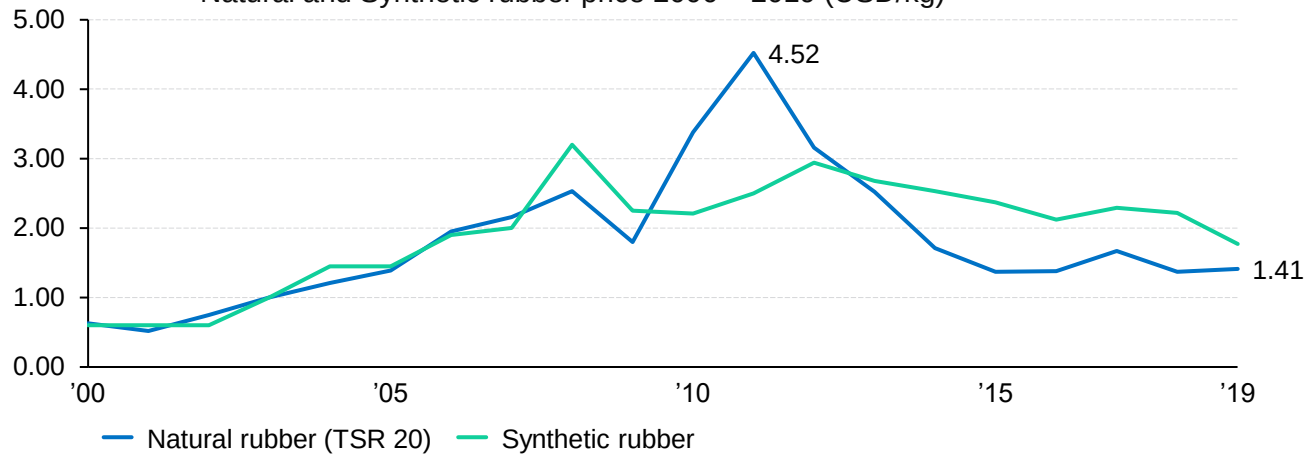




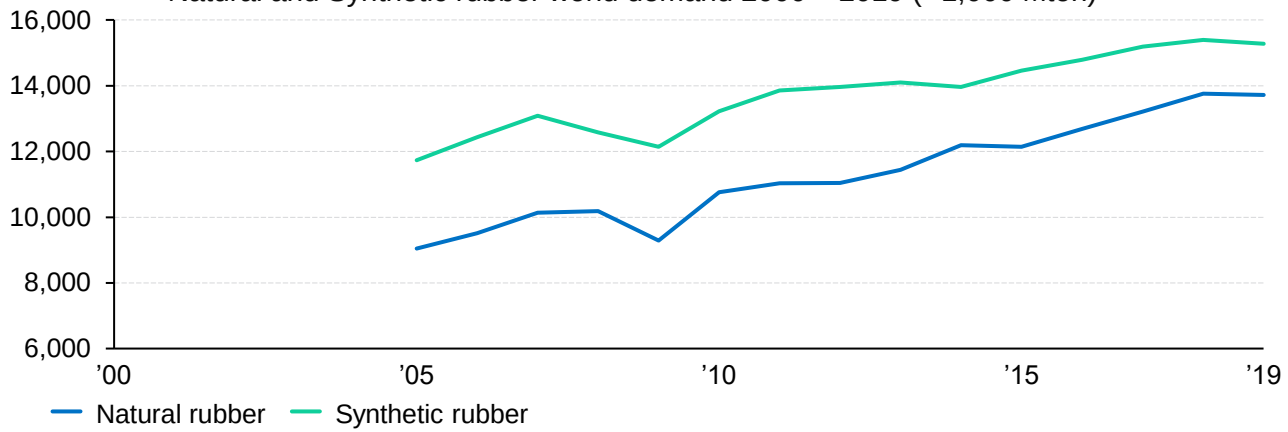
Sources: 1) Plastics & Rubber Indonesia (2019); 2) Wagner (2020); 3) Shah (2019); 4) Otten (2019); 5) Statista (2020); 6) Tilasto (2020)

Global rubber demand and price

Natural and Synthetic rubber price 2000 – 2019 (USD/kg) [4), 10), 11)]



Natural and Synthetic rubber world demand 2000 – 2019 (* 1,000 Mton) [12)]



Characteristics of NR demand and price

- The upward trend between 2005 and 2011 is a result of a sharp rise in crude oil price (which affects the price of synthetic rubber) and increasing demand from China for NR. [1)]
- The peak of price in 2010 and 2017 is caused by floods and draughts in Thailand, with the country supplying almost over 30% of world natural rubber demand. [2), 3) & 4)]
- To stabilize the price in 2019, the International Tripartite Rubber Council (ITRC, an international rubber collaboration between Indonesia, Malaysia and Thailand) made an agreement to reduce the rubber export. [5)]
- The price of rubber is expected to remain stable, as a result of high supply of natural rubber from trees planted after the price peak in 2011 (trees mature in 6 to 7 years). [6)]
- The demand for natural rubber is, after a significant decrease in demand due to COVID-19 in 2020, expected to recover to its initial level of pre-COVID-19 and continue to increase from 2021 onwards. [7)]
- The gap between the demand for synthetic and natural rubber is decreasing. One of the reasons is the quality of natural rubber that synthetic rubber is not able to replace. [8)]
- Indonesia exports about 85% of its rubber production, but exports slightly decline on the back of increased domestic consumption. [9)]

Sources: 1) SETHUNATH (2016); 2) Financial Times (2010); 3) Indonesia Invest (2019); 4) Wagner (2020); 5) IRC (2019); 6) Meyer (2019); 7) Smit (2020); 8) Financial Times (2017); 9) Aisyah (2019); 10) Knoema (2019); 11) Khin (2013); 12) Statista (2020)

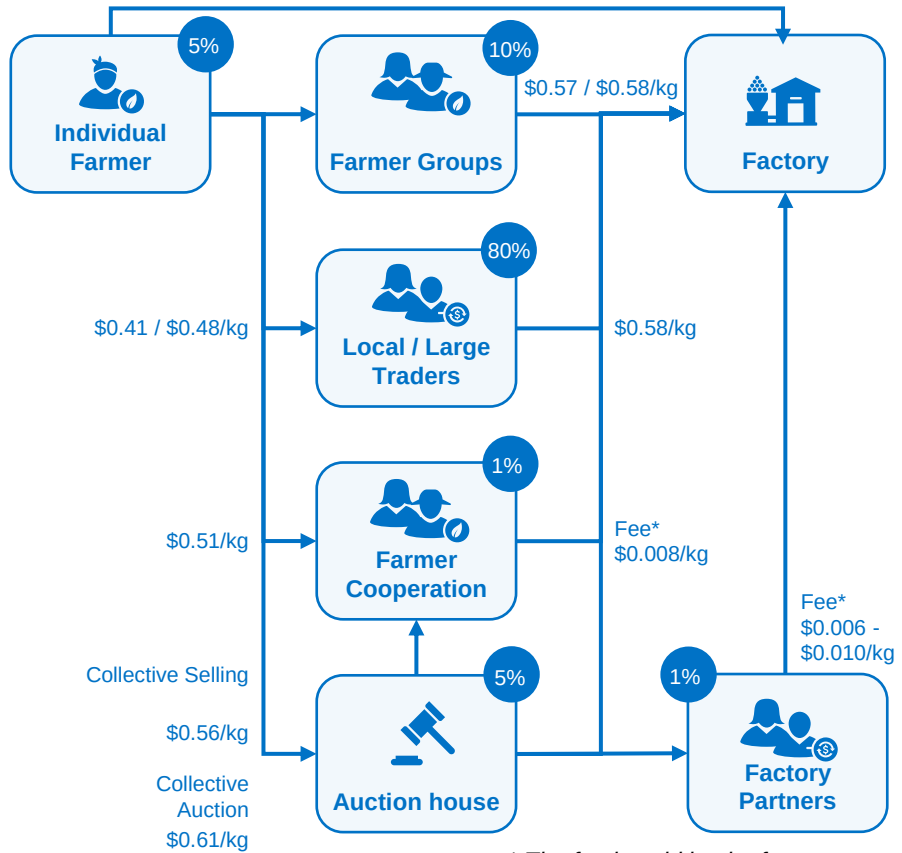
Price setting mechanism and prices across sourcing channels

Price setting mechanism

- Intermediaries receive a price set by rubber processing factories that is based on one of the international exchange prices of TSR 20 (Technically Specified Rubber) for dry rubber content of 100%. The factories deduct the operational costs from the price, and the price is corrected based on quality in line with the dry rubber content (e.g. for a dry rubber content of 50%, the price is halved).
- Contrarily, smallholder receives a price that is not dependent on the dry rubber content, causing intermediaries to bear the up- or downside of the rubber quality.
- The revenue for smallholders is based on weight, hence smallholders are incentivized to provide low quality natural rubber with high water content.

Farmer groups	Farmers collect their product collectively and sell directly to the factory.
Traders	Farmers sell rubber/BOKAR to traders at the village, who then sell to larger traders. Subsequently, the traders will sell to rubber factories.
Cooperation	Farmers sell BOKAR to a rubber depot, which is also a factory's partner. The depot manager receives a fee from the factory for the kg BOKAR they deliver.
UPPB	Through the UPPB, farmers organize an auction attended by factory staff, factory partners and suppliers. When the factory's partner wins the bid, the rubber automatically will go to the factory.
Factory Partners	Usually the factory's partners join the UPPB bidding. They use their own cash to pay the farmers' BOKAR, and receive a fee based on quality. Transportation costs and other risks are paid by the factory.

Selling price per channel in value chain from smallholder to KMG and percentage sourced through by KMG.[1) & 2)]



** The fee is paid by the factory as a top upon the rubber selling price/kg.*

Sources: 1) SNV (2019); 2) KMG data request

Enabling Environment related risks and opportunities (1/2)

Risk level

Low	Average	High

Definition	Challenges	Opportunities
Technology	• Smallholders slowly adopt the use of technology. They use technology to increase their digital connectivity with other smallholders but are reluctant in using technology to increase their knowledge or interact with service providers. [1)]	• The rubber industry of Indonesia is considered as high potential for digital interventions, due to formal value chains with established structures and well-defined roles and economic relationships. [2)]
Environment	• Rubber trees are clones from a limited variety of trees. With low-quality fertilizer, limited knowledge on how to effectively use fertilizer, densely planted rubber tree plantations, and few effective available remedies, diseases (e.g. South American leaf blight) can spread rapidly. [2) & 3)] • Climate change causes more extreme draught and rain peaks affecting the way rubber trees can be cultivated.[4) & 5)] • The increase in hectares of rubber and palm oil plantations causes deforestation and land degradation.	• The majority of South Sumatera's soil consists of Loam [8)], which is good for Natural Rubber and Palm Oil cultivation. • Smallholders can use agroforestry with non-susceptible plants as barriers to block the spread of leaf diseases, which are spread by wind. [3)] • With the support of KMG, a budwood garden with certified clones and a rootstock nursery was established. Farmers can access these for a lower price through subsidies.
Infrastructure	• Due to poor road quality, rubber plantations are difficult to reach and transport costs are high. • Investments in infrastructure might lead to deforestation.	• The Indonesian government, in collaborating with the private sector and impact investors (IFC), invests to improve the quality of infrastructure (roads, ports, electricity etc.). [6)] • The Indonesian government, in collaboration with the World Bank, increases investments in infrastructure of rural areas. [7)]
Labor	• The Indonesia government puts increasing effort in eliminating child labor. However, in 2017, still 5.8% of children between 10 – 14 years perform work, of which 61.6% in agriculture. [9)]	
Financing	• Farmers have a low off-take of Kredit Usaha Rakyat (KUR), due to high complexity of the submission process, and already existing debt positions. [10)] • The majority of smallholders relies on informal financing, with high interest rates and a short tenor. [2) & 11)] Due to the remote location, lack of collateral and legal land title, lack of financial literacy, exposure to production risk, small required loan amounts, and irregular and lengthy repayment schedules, farmers don't have access to finance from commercial financial institutions.[12)]	• The Indonesia government created three credit programs, of which the Kredit Usaha Rakyat (KUR) suits smallholders best (e.g. replanting).[10)] • Together with FACS and FSPs KMG can design fit-for-purpose loan products for replanting and diversifying farmers

Sources: 1) AFN (2020); 2) GSMA (2019); 3) Aria & Van Dijk (2019); 4) CGAIR (2020); 5) CCSR (2009); 6) IFC (2020) / Utomo (2020); 7) World Bank (2019); 8) Geofolio (2020); 9) US Department for Labor (2018); 10) USAID (2020); 11) Singapore Institute (2018); 12) IFAD (2016)

Enabling Environment related risks and opportunities (1/2)

Risk level

Low | Average | High

Definition	Challenges	Opportunities
Inputs	• Smallholder farmers lack access to quality inputs and services such as higher-yielding crop varieties, good quality fertilizers, financial services, extension, technologies and mechanization. [1)]	
Trading system	• There is a complexity in the value chain, due to a variety of systems through which smallholders sell their cultivated rubber to processors. [2)] • There is no effective oversight on regulating intermediary traders' behaviour, although intermediaries serve as key economic links and play important social roles to smallholder groups.	
Pricing & competitiveness	• Over-capacity on world-level leads to low rubber price (TSR-20). • Indonesian smallholders cultivate low quality rubber, resulting in high processing cost for Indonesia rubber processing factories, and low margins due to low selling prices. • Smallholders receive a price per kg of rubber, which is not adjusted for dry-rubber content and quality. Therefore, smallholders have an incentive to produce high-volume low-quality rubber.	• Indonesia is collaborating (Tripartite Rubber Council) to increase stability of natural rubber price, by reducing their natural rubber supply. [3)]
Institutional instability		• Indonesia is a politically stable democracy. A comprehensive push for decentralisation has seen much power transferred to the regions [4)] and increased the effectivity of the government.[5)]
Land tenure	• IFC estimated that over 90% of smallholders do not have a formal land title. [7)] The land owned by smallholders is unequal distributed between genders. [5)] • The majority of land is held under informal or customary tenures. Most landowners rely on letters (SKT) from local officials authorizing land transfers. [8)]	• The Indonesia government aims to distribute land rights to smallholders, who have their doubts on effectiveness.[6)]
Social norms	• In Indonesia, woman own less land compared to men, have lower school enrolment and earn less (ratio 0.72). [9), 10) & 13)] • The Indonesia cultures has a significant Power Distance, which is the extent to which the less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally.[14)]	• The vast majority of Indonesian people is Islamic.[11)] Islamic finance providers do not charge interest, but use profit sharing rate systems.[12)] • The Indonesian culture is long-term orientated. Hence, they encourage thrift and efforts in modern education as a way to prepare for the future.[14)]

Sources: 1) USAID (2020); 2) IFAD (2016); 3) Kopp (2019); 4) Gov.UK (2020); 5) World Bank (2017); 6) Jong (2017); 7) GSMA (2019); 8) FAO (2019); 9) GSMA (2019); 10) FAO (2019); 11) Jacobs (2019); 12) Khalidin & Masbar (2017); 13) DHS Indonesia (2017); 14) Hofstede (2020)

Rubber production in Musi Banyuasin and Banyuasin districts

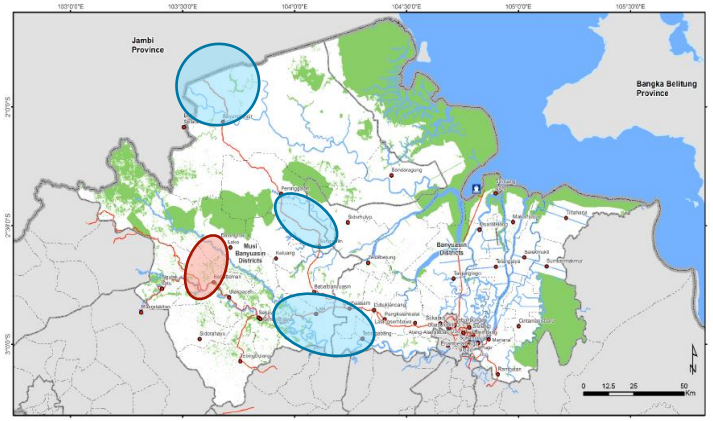
Significant deforestation in north east South Sumatera between 2005 / 2016

Forest cover of Musi Banyuasin and Banyuasin in 2005 and 2016.

District	Forest cover (Ha) *2005*	Forest cover (Ha) *2016*	Delta Ha	Delta %
Banyuasin	251,693	200,505	-/- 51,188	-/- 20%
Musi Banyuasin	320,614	138,402	-/- 182,212	-/- 57%

Area used to cultivate rubber are closely located to HCV areas *

Land cover map of rubber and high conservation area in Musi Banyuasin and Banyuasin.



Legend

- HCV area
- Rubber area KMG sources
- Rubber area KMG does not source from

Land cover Musi Banyuasin	Share %
Degraded forest	10%
Plantation forest	6%
Oil palm	22%
Rubber	3%
Other agriculture	49%
Other activities	10%

Land cover of Musi Banyuasin and Banyuasin districts

- Forest cover has significantly reduced from total 572,000 hectares in 2005 to 339,000 hectares in 2016 (decline 41%).
- Around 80% of land is dedicated to agriculture, 10% to (degraded) forests and another 10% to open lands and urban areas.
- There are 137,530 and 429 hectares of shallow (50-200 cm) and deep (>200 cm) peatlands, respectively.
- The area includes biodiversity hotspots of Berbak-Sembilang National Park, Dangku Wildlife Reserved, Peat Ecosystem Areas of S. Merang-S.Ngirawan, and Forest Management Units.
- Around 65,000 hectares are suitable and available for sustainable expansion of forest plantations.

Cultivation and HCV conflict

- Currently no clarity exists on the risk of deforestation as KMG is sourcing from middlemen and not collecting data on farmers directly sourced from.
- With increasingly stricter demands from certification standards and buyers KMG is highly recommended to rapidly expand the scope of data collected to get a detailed understanding of farmer geographies , farmer performance and sourcing risks such as deforestation.
- Sourcing area from KMG is closely located to HCV areas in the mid of Musi Banyuasin district.
- KMG is involved in the sustainable landscape project in South Sumatra (KELOLA Sendang Project) covering Musi Banyuasin and Banyuasin districts.

Sources: Deameter (2019) Rencana Implementasi VSA di Musi Banyuasin

** HCV areas = High Conservation Value area*

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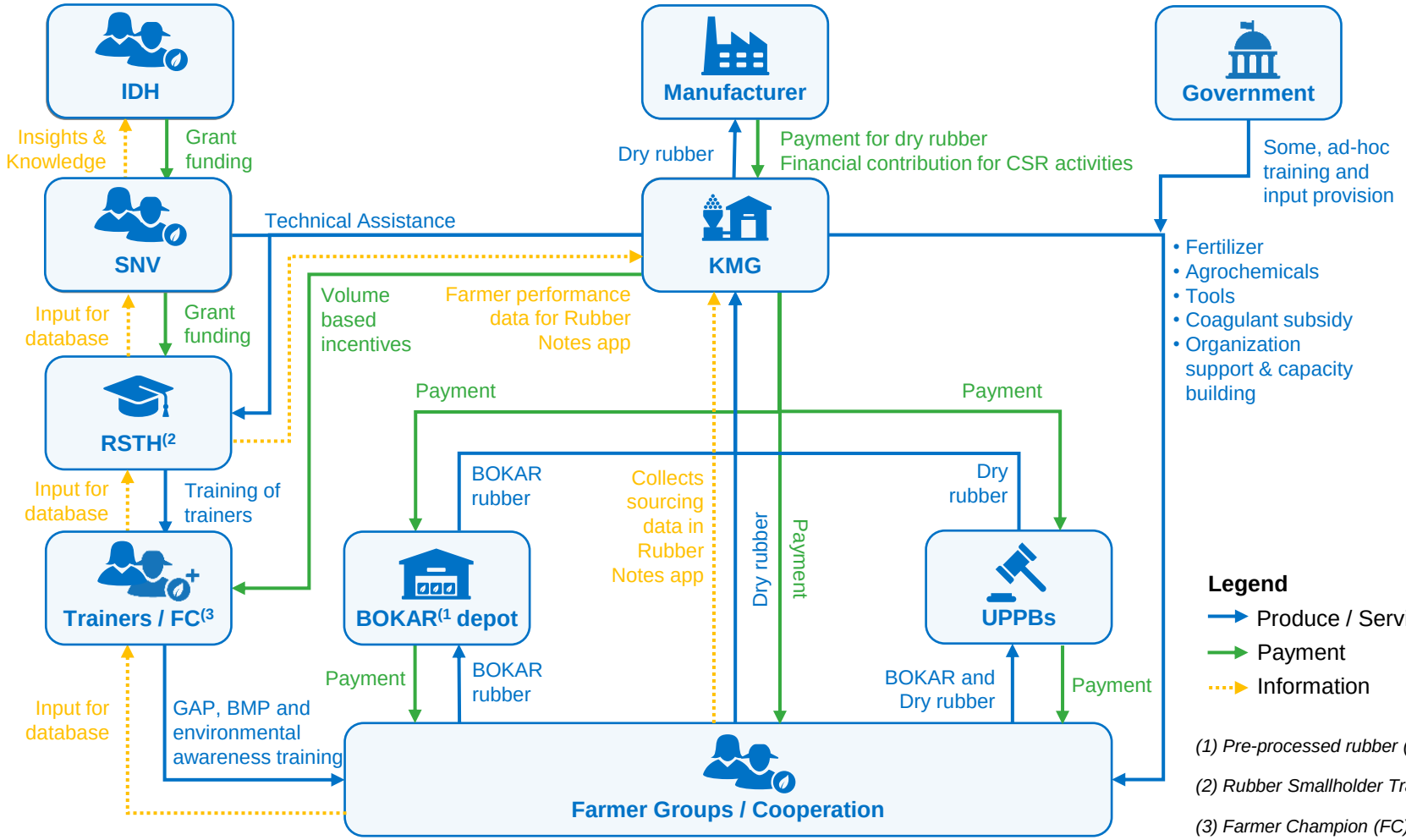
Current service provision infrastructure



Legend

- Produce / Services
- Payment
- Information

(1) Pre-processed rubber (BOKAR)

(2) Rubber Smallholder Training House (RSTH)

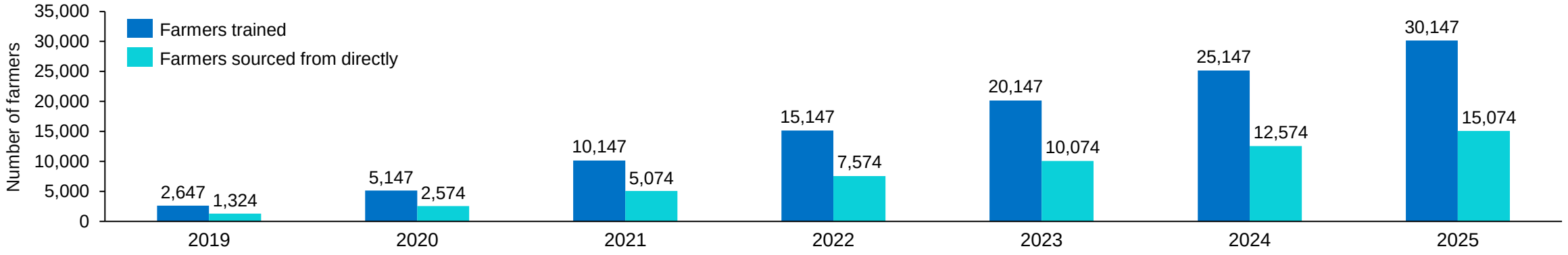
(3) Farmer Champion (FC)

Service description

- In the current scenario KMG establishes a Rubber Smallholder Training House with the support of IDH and SNV
- Trainers and Farmer Champions are trained at the RSTH, who in turn train the farmers and farmer groups
- Farmer groups receive inputs directly from KMG
- Farmer groups sell their rubber to a rubber depot, through UPPBs, or directly to KMG's factories
- Farmers from whom KMG sources directly receive a quality premium.

Projected growth in farmer numbers

Projected number of farmers trained and sourced from



Starting sourcing

- In 2017 KMG started sourcing from smallholders in South Sumatra
- KMG partners with SNV to detect and reduce unsustainable practices and deforestation using Responsible Sourcing from Smallholder approach

Laying the foundation

- In 2018 - 2019, SNV and donors developed and implemented the Rubber Smallholders Training House (RSTH)
- Farmers are more formally organized into groups and cooperatives, and sell directly to the factory or through UPPB auctions
- KMG sources around 2,000 MT responsible and sustainable rubber per annum, offering fair and transparent prices

Strengthening farmer organizations

- From 2020 onward, IDH provides additional technical and financial support
- More farmers are joining farmer groups and cooperatives. Farmer organizations are further professionalized
- Farmer Champions are incentivized to training a growing number of farmers
- SNV conducts baseline survey on farmer performance and needs
- FACS assesses farmer finance needs for optimal rubber replanting strategies

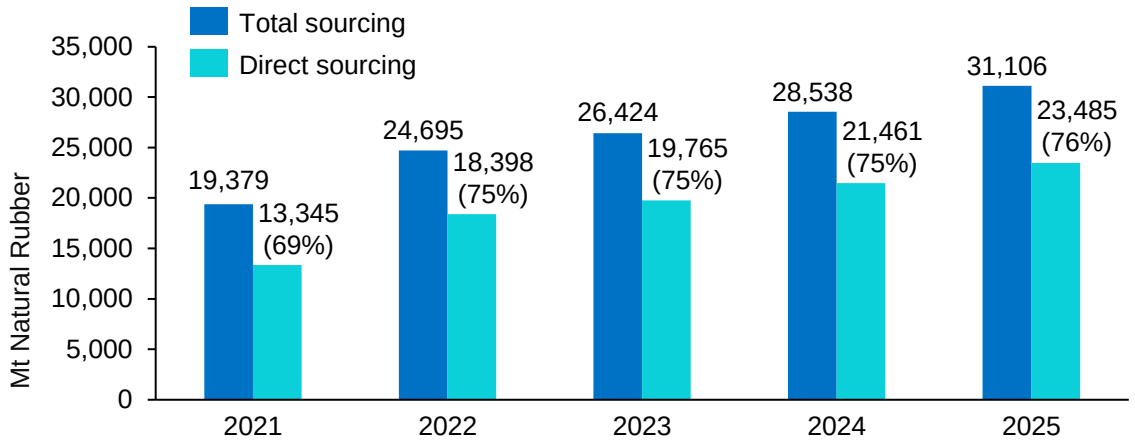
Scaling up

- While a clear strategy does not exist beyond 2022, KMG and partners aim to grow the number of trained farmers to 30,147, and they will source directly from half of those farmers
- This will be achieved by continuing and expanding the current project, either with SNV or another third party
- Activities within this program include service optimization based on on-farm results, farmer and farmer organization segmentation, sharpening incentive mechanisms and implementing building blocks to enable farmer access to finance

Sources: SURPASS Kickoff Meeting, SNV 2020

Projected total and direct sourcing volumes

Projected total and share of direct sourcing volumes



Expanding the direct sourcing channel

- Acknowledging the key role played by middlemen, KMG still needs to move into direct sourcing to ensure more control over the performance of farmers, meet increasing demand for traceability and increase efficiency
- In the coming years, KMG aims to increase the share of direct sourcing towards around 76%. This includes sourcing from individual farmers, farmer groups, UPPBs and coops.
- Currently KMG sources around 70% of their rubber through middlemen
- Most of these middlemen are not equipped to correctly assess the quality, and therefore the price. Incorrectly calibrated scales also lead to unfair pricing
- However, these middlemen are located close to the farmers, and can provide them with immediate cash for their rubber. Some even offer advance payments to secure loyalty, or in-kind loans (e.g. sugar, rice, salt). Additionally, middlemen prevent an information overload by delivering organized and decision-related information to farmers. Middlemen also play a role in coordination and transportation

Current activities and farmer services

Commercial activities | **Supporting activities** | **Direct farm services**

Downstream - Upstream

Transportation

Transportation is done by farmer groups and traders. KMG is not involved with the transport of natural rubber to and from the factory and its purchasing depots.

Sourcing & processing

KMG processes field-processed cup lumps to TSR natural rubber (SIR 10, SIR 20, and SIR 20 CV). The lumps are field-processed latex sourced from smallholders through middlemen and factory partners

Market access

Any KMG-trained farmer group can sell directly to KMG's factories. Factories, and other selected rubber depots, are easy to reach due to investments in facilities and infrastructure. Besides, KMG supports the use of UPPBs.

Data collection and M&E

KMG collects data on plots size, volume of rubber sold, and chemicals used on smallholder group level. In the future, KMG plans to collect land type and distance to HCV.

Financing (replanting)

KMG can facilitate access to micro-financing to smallholders, but cannot act as guarantor for any micro lenders.

Farmer organization capacity building

KMG, in collaboration with SNV, supports the establishment of formal farmer organizations. To build capacity, selected farmers receive institutional and business training.

Input provision

KMG provides subsidies to smallholders for coagulants*, fertilizers, seedlings, and tools to smallholders as performance rewards, and/or GAP and BMP implementation.

** Coagulants are dried rubber sheets.*

Farmer training

KMG provides its own training to farmers and provides training to trainers in collaboration with SNV. The trainers provide training to smallholders on GAP and BMP and environmental awareness.

Empowering communities

KMG provides scholarships for children of smallholders, to help support better livelihood. Some are provided with financial support from its strategic tire-maker buyers.

Sources: SURPASS Kickoff Meeting, SNV 2020; SDM Information Request SNV and FACS

Evaluation of current direct farm services*

Commercial activities | Supporting activities | **Direct farm services**

Service	Current situation	Identified issues & unclarities	Suggestion for improvement
Training	• KMG provided part of the curriculum for the digital training house • KMG pays an incentive to Farmer Champions • Baseline farmers have insufficient knowledge on GAP and BMP, which is reflected in suboptimal tapping techniques and post-harvest handling. Additionally, no inputs or low-quality inputs are used • Demoplots are established to implement GAP and BMP	• Farmer Champions do not receive proper incentives needed to increase quality • The effect of trainings is limited since farmers are only trained once and there are no recurring trainings	• Farmer Champions (and farmers) should have the right incentives (quality, sustainability) to make the trainings as effective as possible • KMG should think through how they can provide more effective incentives, in order to affect quality and sustainability as well as quantity
Input provision	• Ad hoc provision of seedlings, fertilizer and coagulants to farmers that perform well • Farmers only buy inputs from retailers if they are located nearby, and occasionally KMG provides fertilizers or coagulants for free on an ad hoc basis.	• Farmers do not know when or why they are eligible to receive inputs, so there I no clear incentive to increase performance • Not all farmers have access to inputs	• High-quality, affordable inputs should be provided in a structured way, to all farmers that are trained and organized into groups • This will increase training effectiveness and boost production and quality • KMG could provide these inputs themselves, or (financially) support farmer coops in providing this service
Replanting & diversification	• Feasibility for replanting and long-term financing done • No clarity on replanting service design and implementing partner(s)	• Farmers have no/limited knowledge about replanting and the benefits of diversification	• This should be part of the trainings, and farmers should receive support with this • KMG can support this by developing a training curriculum, (support with) providing these trainings and/or (support with) providing seedlings

Assessment of the commercial and supporting activities has been removed as it contained competitive information.

To detailed segment descriptions

Evaluation of current farmer segmentation

Criteria for farmer segmentation approach:	Status	Comment
Is embedded into the organizations' strategy and operations	Partly	Only two farmer performance indicators (see below) are measured and used to inform decision-making. • *Land size* is used as a proxy for farmer wealth and to understand different business cases • *Distance to factory* is used by KMG to decide whether or not to work with farmers (only those less than 100 km away)
Introduces a clear and useful terminology that aligns people intra- and interorganizational and can be used for decision-making	Partly	• KMG only uses indicators to inform sourcing, whereas SNV uses indicators to understand farmer wealth • Indicators are not linked into one framework, nor consistently used by both organizations • Some indicators are defined and documented, others not
Has a clear graduation strategy, linked to progressive incentives, sourcing benefits and service packages	No	• Farmer performance indicators are not used to adequately tailor services based on their needs • No graduation strategy exists • Price incentives exist for DRC %, but limited awareness exists among farmers due to many intermediaries • Service provision is not clearly linked to farmer performance and therefore not enticing the desired farmer behavior.
Defines measurable and relevant performance indicators (e.g., yield, inputs used, costs of production) per segment	Partly	Currently farmers are assessed on three different indicators: • *Land size* (<2 ha; 2-5 ha; >5ha): useful to understand income differences by farm size and relatively easy to measure • *Distance to factory* (<20km; 20-100km; >100km): useful to prevent sourcing of unsustainable rubber, relatively easy to measure • *Risk appetite*: relevant to identify high-potential farmers, but not measured in any way
Defines segments that are representative of farmers in the field	Yes	• Farmers are fairly represented when grouping them based on either land size or distance to factory

To detailed segment descriptions

Proposed farmer segmentation

	Constrained	Unaware	Skilled	Professional	Resilient
Farming system	• Poor knowledge of GAP, BMP and processing • No/poor application of inputs • Limited access to high-quality inputs • No/limited access to affordable inputs nor loans	• Poor knowledge of GAP, BMP and processing • Poor application of inputs • Limited access to high-quality inputs • Has sufficient resources and/or access to short-term loans	• Good knowledge of GAP, BMP and processing • Better application of inputs • Access to high-quality inputs • No/limited access to affordable inputs nor loans	• Good knowledge of GAP, BMP, processing and EA • Good application of inputs • Access to high-quality, affordable inputs • Has sufficient resources and/or access to short-term loans	• Good knowledge of GAP, BMP, processing and EA • Good application of inputs • Access to high-quality, affordable inputs • Has sufficient resources and/or access to short-term loans • Adequately rejuvenates farm • Has diversified farm
Tree age (years)	25	15	25	15	15 >
Yield (kg/tree)	1.20	1.82	1.64	2.27	2.27 >
Quality (% DRC)	45%	55%	60%	60%	60% > 66%
Services	**Training and farmer organization**				
		Access to inputs (on credit)			
				Access to better fertilizers and larger loans	
					Replanting and diversification
Graduation					
Can graduate to	Skilled	Professional	Professional	Resilient	
Criteria for graduation	• Training attendance • Proven good application of practices	• Training attendance • Proven good application of practices • Increased DRC %	• Training attendance • Increased yields • Increased DRC %	• Consistently high yields • Consistently high DRC % • Proven financial track record • Collateral for loans	

To (dis)advantages of sourcing channels

Description of existing sourcing channels

		Direct sourcing		
	Intermediaries	**UPPBs**	**Cooperative**	**Farmer groups**
Description	Varying from small to large traders fulfilling a range of logistical, input and financial service provision functions.	Organized at the village level or higher and usually have around 50 members. Members can also be farmers that are also part of a farmer group. Their focus is on marketing and collective selling through auctions.	Formally registered legal entities at the regional level. Due to their legal status they can provide access to finance. Can also take on role of UPPB or service provider (e.g. input provision). Multiple farmer groups in a region can be linked to 1 coop.	Farmer groups are organized at the village (or even sub-village) level and consist of 20 to 25 farmers, and are set up after a few of these farmers have received institutional trainings by SNV on how to set up such groups.
Sourcing	Farmers sell their rubber to local traders, who sell it to the factories.	Farmers sell their rubber through a UPPB, which organizes an auction market, attended by factory staff, factory partners and/or suppliers.	Farmers sell rubber to a depot (factory partners). The depot receives a fee from the factories, and costs like transportation and loading costs are charged to the factory.	These groups focus on the technical aspect of rubber cultivation, and GAP/BMP trainings are provided at this level.

Why UPPB is good for the smallholder community

- Majority of UPPB functions as an auction house for smallholder members where their rubber products can be sold to the highest bidder.
- The registration process at the local government level is not as cumbersome compared to establishing a cooperative, so one can get started relatively quickly.
- Since it is not a cooperative, by government regulation members are not subjected to regular payment of dues. In practice, all they have to pay to the UPPB management is a fee per transaction on auction day.
- However, unlike a cooperative, UPPB does not have the legal footing to be bankable. So UPPB cannot secure any loan from a bank or bank-like financial institution.

Why UPPB is not a suitable long-term partner for KMG

- As with any other existing auction houses run by farmer cooperatives, KMG cannot always and often does not win the rubber bidding, given that the purchasing margin is set against the prevailing international price of the day.
- Rubber (intermediate) traders or dealers are the most suitable buyers at auction houses as they typically own batches of rubber purchased at various prices, with market distribution to several factories each with different quality preferences, and have the option of when to sell the rubber at a favorable price movement.
- That UPPB has a general better quality than existing cooperatives or farmer groups is just a perception or myth with no evidence. Only rubber factories and research institutes have the laboratory facilities and skilled personnel to ascertain rubber quality. Even traders do not bother to invest in such facility insofar as they can always realize a positive margin. UPPB or any cooperative in the whole country does not have the capability to assess quality in objective manner.
- Government does not perform any supervision role nor does it mandate certain standards on UPPB.
- Many UPPB once registered at the urge of government cease to operate.

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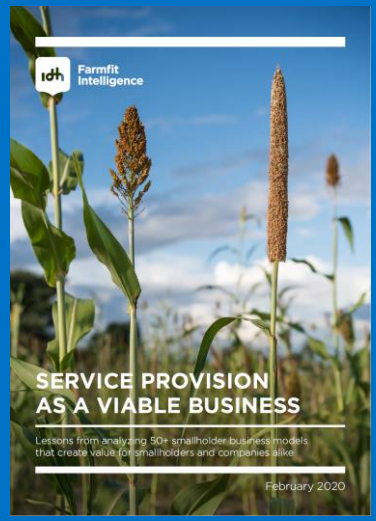

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Chapters in this report

Executive Summary	• States the purpose of the analysis and summary of recommendations • Provides a short description of KMG and an assessment of the current business model that is being implemented in collaboration with SNV
Recommendations	• Proposes a blueprint for the future design of the model • Assesses the performance of the proposed design (improved case) and compares it against the current business model (baseline case)
Context	• Describes the Natural Rubber market and value chain • Analyses the enabling environment and key sustainability risks
Strategy	• Describes the current strategy of KMG and SNV • Details proposed improvements as included in the main recommendations
Annex	• Explains the methodology of the Digital Maturity Assesment • States data sources and assumptions (private version only)

Recommended digital solution: design Package of Services

Challenge	Challenge description	Solution	Solution description	Approach
Limited support for rubber farmers to adopt improved growing practices: Barring the training provided on good agriculture practices by SNV, rubber farmers receive minimal support in terms of inputs, credit or other services for adopting good agriculture practices. Moreover, they don't have a complete understanding of the long-term gains that could be accrued through sustainable rubber production.	**Low direct engagement with farmers:** Due to the prevalence of multiple intermediaries in the rubber value-chain, processors are unable to directly engage with rubber farmers or control their supply from the source. On the other hand, the rubber farmers don't have complete understanding of the long-term benefits of adopting GA. They sell most of the rubber produced to the intermediary offering the best price or to whom they owe debt repayment. Hence, it becomes risky to support a farmer.	**Design package of services (PoS) for direct-sourcing supply chain, based on long-term production and earning projections for farmers:** The improved data collected from KMG's farmer training app can be used to **plan long-term yield and earning projections with farmers** and for offering a package of services suited for the farm.	**Onboard farmers for PoS:** A business plan can be built and shared with farmers (in partnership with SNV) consisting of a 5 or 10 years earning projections vs. projections when a PoS is adopted. The PoS can include inputs (coagulants, seedlings, fertilizer) in addition to the GAP and BMP training and can later be extended to offer more services such as financing, logistics, and insurance. **Selected farmers, with consistent record of association and supply can be onboarded first to the PoS program by depositing a percentage of service costs**. The remaining cost maybe be recovered in equal installments, from the payments farmers receive when they deposit the rubber every month.	• Work together with the business team, rubber agronomy experts (internal or external) and internal application development team to add the module of farm projections to the farm training app. The agronomy team can then design the PoS for the most prevalent farm scenarios. • For making the PoS accessible on credit, either internal finance experts can be consulted (to offer credit from own balance sheet) or partner with a rural-focussed financial institute. **Examples of suitable financial institutes:** Amartha tunaiku

Estimated initial investment: EUR 175,000* (*PoS pilot)
- 2000 farmers enrolled for PoS pilot
- EUR 100 per farmer as cost of PoS per farmer
- 25% upfront payment collected from farmers

Estimated RoI period: 2-3 years

Outcomes of Ditigal Maturity Assessment

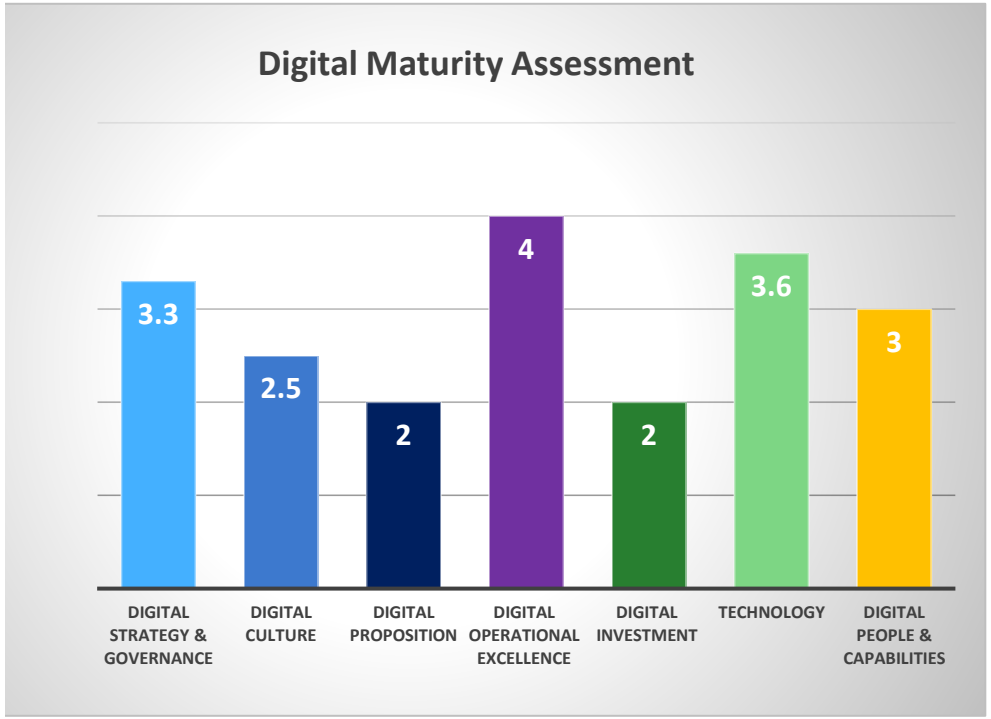
1. Results

The digital maturity assessment for ALSA shows an average score of **3 out of a maximum level 5**

- KMG's strongest digital suit is their IT team which consists of application developers, testers and IT infrastructure support personnel. This makes KMG less reliant on external vendors to implement any digital solution.
- KMG's 15 plants are linked through an SAP system and their value-chain operations are digitally monitored, but only from the moment rubber is received at the plant.
- Although there is a vision on having an end-to-end traceable value-chain with certified sustainable production, there are limited initiatives towards such an implementation.
- KMG holds improving organization processes in high regard but there is limited focus on similarly encouraging digital innovations

2. Risks & key barriers

- Low visibility of the supply chain from production of rubber and through various intermediaries before the produce reaches the plant
- Limited effort on deploying digital solution in the rubber production areas or for producers.
- Although there is a fixed budget allocation for IT department, there isn't a dedicated role in the team or systemic effort towards exploring digital innovations.
- Lack of incentives and structured trainings for building a digital mindset or skillset of employees



3. Recommendations

- Expedite development of an app to collect and monitor farm level data to meet future sustainability and productivity goals.
- Focus on exploring digital solutions for the farms and farmers including advanced mapping (remote sensing) of tree growth areas, real-time monitoring of tree health and yield (via sensors).
- Train existing staff with a digital / tech propensity, and build a roadmap for having resources to focus on a digital strategy
- Allocate a digital innovation budget within the multi-year planning, thereby ensuring commitment to digital transformation
- Ensure that the digital knowledge is shared within the organization. Incentivize employees to ideate on innovative digital solutions

SDM-level assumptions per scenario

SDM scenarios

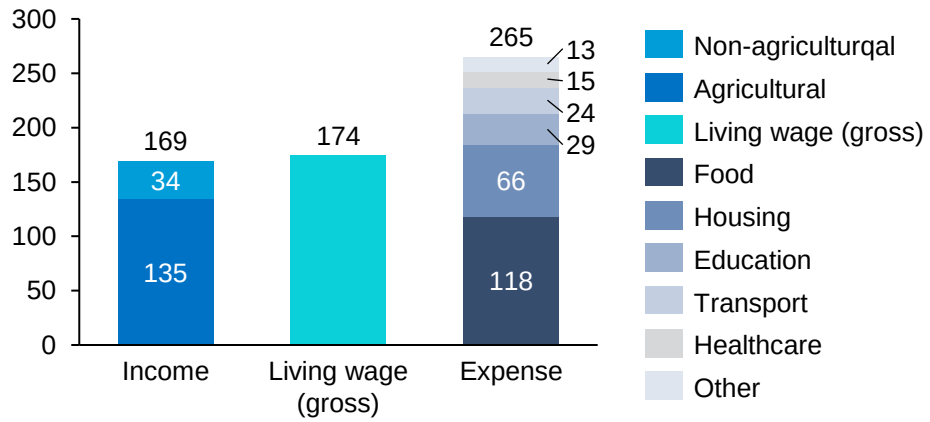
Indicator	Baseline scenario	Improved scenario
SNV staff (after 2021)	0	5
FCs trained annually (after 2021)	0	100
Graduation: segment 1 to 2	5%	10%
Graduation: segment 2 to 3	0%	5%
Input provision	Ad hoc by KMG	Structural by farmer organizations
New farmer groups per year (after 2021)	0	100
New UPPBs per year (after 2021)	0	5
New farmer coops per year (after 2021)	0	1
Replanting as a service	No	Yes

Basic rubber farmer information

Household profile

- The median smallholder household consists of 4 people, with two parents and two children.
- Smallholders earn significantly less than the living wage of US$265 per month and struggle to cover all expenses.[2] However, Indonesia has one of the fastest reductions of multilevel poverty. [3]
- In South Sumatera, 66.8% of the women have completed primary school (men: 70.4%). Besides, 35.3% of the women perform agricultural work (men: 38.1%). [4]

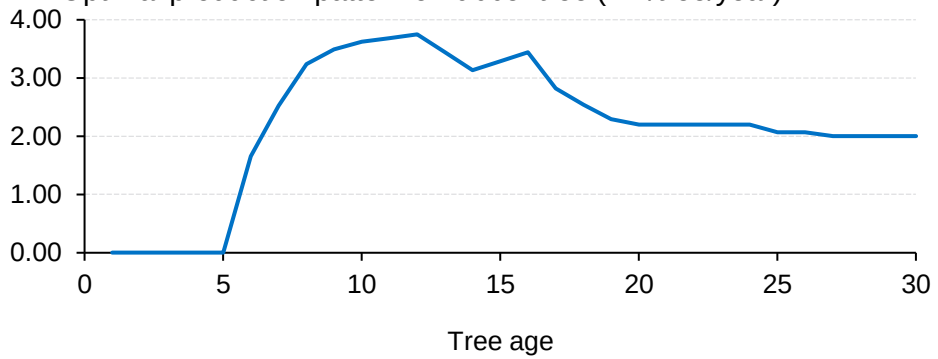
Living wage smallholders in Indonesia ($/year). [2]



Agronomics

- Smallholders in South Sumatra cultivate between 2 – 3 Ha of rubber trees (Jambi and West Kalimantan < 2 Ha).[1]
- Productivity of natural rubber is estimated at 0.99 ton/ha, which is low compared to the optimal yield.[6]
- The trees produce high quantity of latex with high rainfall in the evening and little in the morning. Therefore, the annual productivity peaks in May and is lowest in September.[6]
- Most rubber trees in South Sumatera are planted between 2005 – 2015, of which the majority is from superior clones (PB260 variety).[6]
- In the fifteenth year, the yield increased due to renewable bark. This is the fully recovered initial tapping panel.[6]

Optimal production pattern of rubber tree (MT/tree/year) [7] & [8]



Sources: 1) IDH information request, SNV and FACS 2020; 2) WageIndicator.org (2019); 3) UNDP (2019); 4) DHS Program (2017); 5) WeForum (2020); 6) USAID (2020); 7) Scribd (2020); 8) Munasinghe & Rodrigo (2018)

Farmer-level assumptions per segment

	Farmer segments				
Indicator	**Constrained**	**Skilled**	**Unaware**	**Professional**	**Resilient**
General					
Starting yield (kg/tree)	1.21	1.94	1.64	2.27	2.27
Total farm size (Ha)	2.0	2.0	2.0	2.0	2.0
Tree density (start)	550	550	550	550	550
Tree density (replanting)	470	470	470	470	470
Average tree age (years)	25	25	15	15	15
Replanting rate	No	No	No	No	Staggered
Diversification					
Banana	No	No	No	No	Yes
Pepper	No	No	No	No	Yes
Turmeric	No	No	No	No	Yes

Farmer-level assumptions per segment

Farmer segments

	Constrained	Skilled	Unaware	Professional	Resilient
Inputs & practices					
Trained & practices applied	No	Yes	No	Yes	Yes
Fertilizer package (Litres/ha/year)	Low	High	Medium	Optimal	Optimal
Amount of agrochemicals applied	0	10	5	10	10
Coagulant used	Alum	Formic Acid	Sulphate	Formic Acid	Formic Acid
Post-harvest storage (# weeks)	0	2	1	2	4
Cup latex usage	No	Yes	Mixed	Yes	Yes
Rubber stimulant	No	Yes	No	Yes	Yes
Sales					
Average DRC %	45%	60%	55%	60%	66%

Farmer-level assumptions per segment

Farmer segments

	Constrained	Skilled	Unaware	Professional	Resilient
Intercropping	N/a	N/a	N/a	N/a	
Turmeric (IDR/ha/year)	N/a	N/a	N/a	N/a	*3,185,000*
Revenue (year 3 >)	N/a	N/a	N/a	N/a	5,310,000
Costs (year 3 >)	N/a	N/a	N/a	N/a	- 2,125,000
Banana (IDR/ha/year)	N/a	N/a	N/a	N/a	*4,535,000*
Revenue (year 1 & 2)	N/a	N/a	N/a	N/a	8,750,000
Costs (year 1 & 2)	N/a	N/a	N/a	N/a	- 4,215,000
Pepper (IDR/ha/year)	N/a	N/a	N/a	N/a	*4,205,000*
Revenue (year 1 & 2)	N/a	N/a	N/a	N/a	7,595,000
Costs (year 1 & 2)	N/a	N/a	N/a	N/a	- 3,390,000

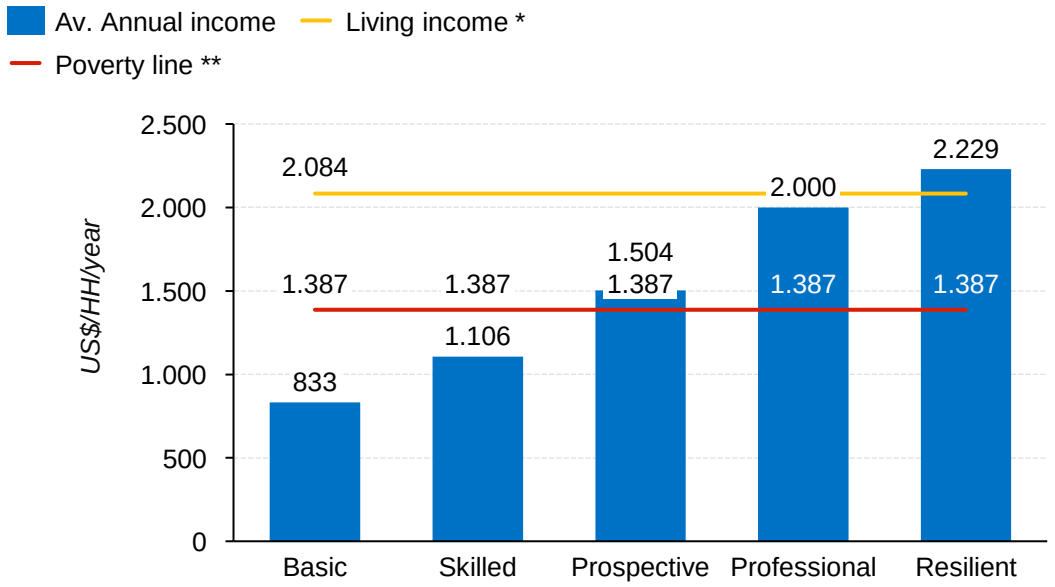
Farmer-level assumptions per segment

Farmer segments

	Constrained	Skilled	Unaware	Professional	Resilient
Other income (IDR/year)	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000
Replanting regimes					
One-off (% of rubber plot)	N/a	N/a	N/a	N/a	Year 1: 100% Year 2: 0%
Staggered (% of rubber plot)	N/a	N/a	N/a	N/a	Year 1: 50% Year 2: 50%
Seedling price (IDR/tree)	N/a	N/a	N/a	N/a	2,500
Fertilizer application package (gram/tree/year)					
Low / Medium / High / Optimal	Urea: 0 TSP: 0 KCl: 0 ZA: 0 *= Low*	Urea: 0 TSP: 160 KCl: 100 ZA: 200 *= High*	Urea: 0 TSP: 80 KCl: 50 ZA: 100 *= Medium*	Urea: 200 TSP: 160 KCl: 100 ZA: 0 *= Optimal*	Urea: 200 TSP: 160 KCl: 100 ZA: 0 *= Optimal*
Latex stimulator (#/ha/year)					
Times applied per season	N/a	12	N/a	12	12
Price charged to farmer (IDR/use)	N/a	60,000	N/a	60,000	60,000
Transport cost (IDR/kg)	267	267	267	267	267

Comparing farmer incomes against living income

Comparing household income, living income benchmark and poverty line.
Shown average annual income for each farmer segment, in USD/household/year



Gap to Living income [1)]	60%	47%	28%	4%	0%
Gap to Poverty line [2)]	40%	20%	0%	0%	0%

*`The living income benchmark in Indonesia assumes a basic but decent standard of living for a typical size family of 2 parents + 2.5 children, and of which 1.7 are working.
** Based on the international poverty line of 1.9 USD/capita adjusted using the PPP conversion factor for Indonesia and assuming 2 adults per household.
*** Approximate hectares for Resilient farmer decrease as yield per replanted trees increases.

Sources: 1) WageIndicator.org (2019); 2) WorldBank (2020)

Impact on farmer incomes

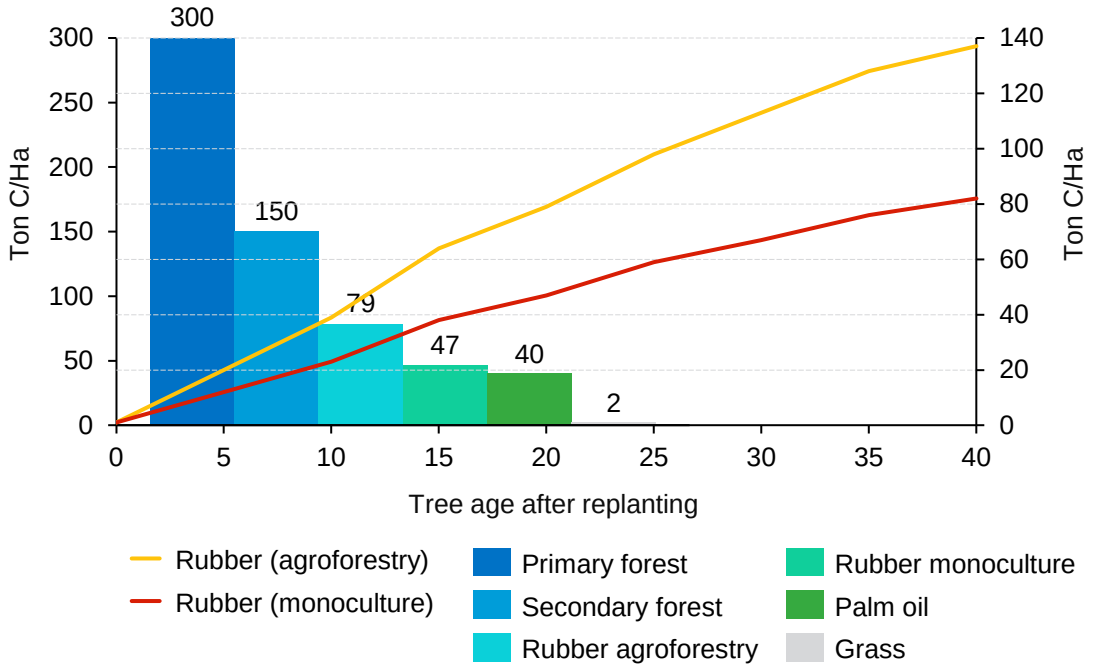
- Expanding the farm size is one way to closes the gap to a Living Income. However, lack of performing GAP and BMP requires a Constrained farmer to increase its farm size significantly more than the Resilient farmer, which increases the risk of deforestation.

Approximate hectares needed to close gap to living wage.	
Basic	**7.5 Ha**
Skilled	**5 Ha**
Prospective	**7.5 Ha**
Professional	**5.5 Ha**
Resilient	**4.5 Ha *****

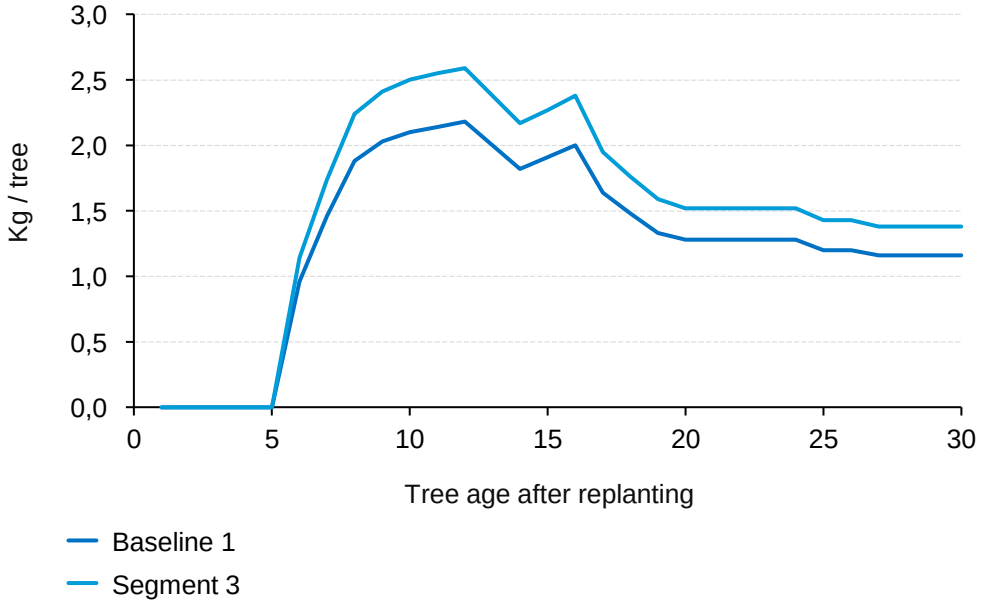
- Cultivation of diversified crops (Banana, Pepper and Turmeric), enable the Resilient farmer to earn income, while its replanted trees are yet to reach their full yield potential (maturity).
- As the existing rubber trees of the Professional farmer provide too much shade to cultivate diversified crops such as banana and pepper, the Professional farmer is able to cultivate Turmeric to close the gap to a living income.

Carbon and land use change assumptions

Deforestation significantly reduces above ground carbon stock.
Above ground annual and time-averaged carbon stock of different land use (ton C/Ha). [1)]



Increased yield (kg/tree) reduces need for deforestation.
Natural rubber yield curve kg/tree over time.



CO2 Sequestration

Shown in the above figure, conversion of natural forests to rubber, oil palm, and other agricultural commodities has significant negative impacts on carbon stocks. Primary forest (300 ton C/Ha) stores significantly more carbon compared to Agroforestry (79 ton C/Ha) and Mono cultural rubber cultivation (47 ton C/Ha).

Reduce deforestation

Shown in the above figure, GAP and BMP increase yield (kg/tree) over time. Increased yield reduces the incentive for smallholders to expand their farm area and on an aggregate level the total land size required to produce the same rubber volumes

Sources: 1) USAID (2020)