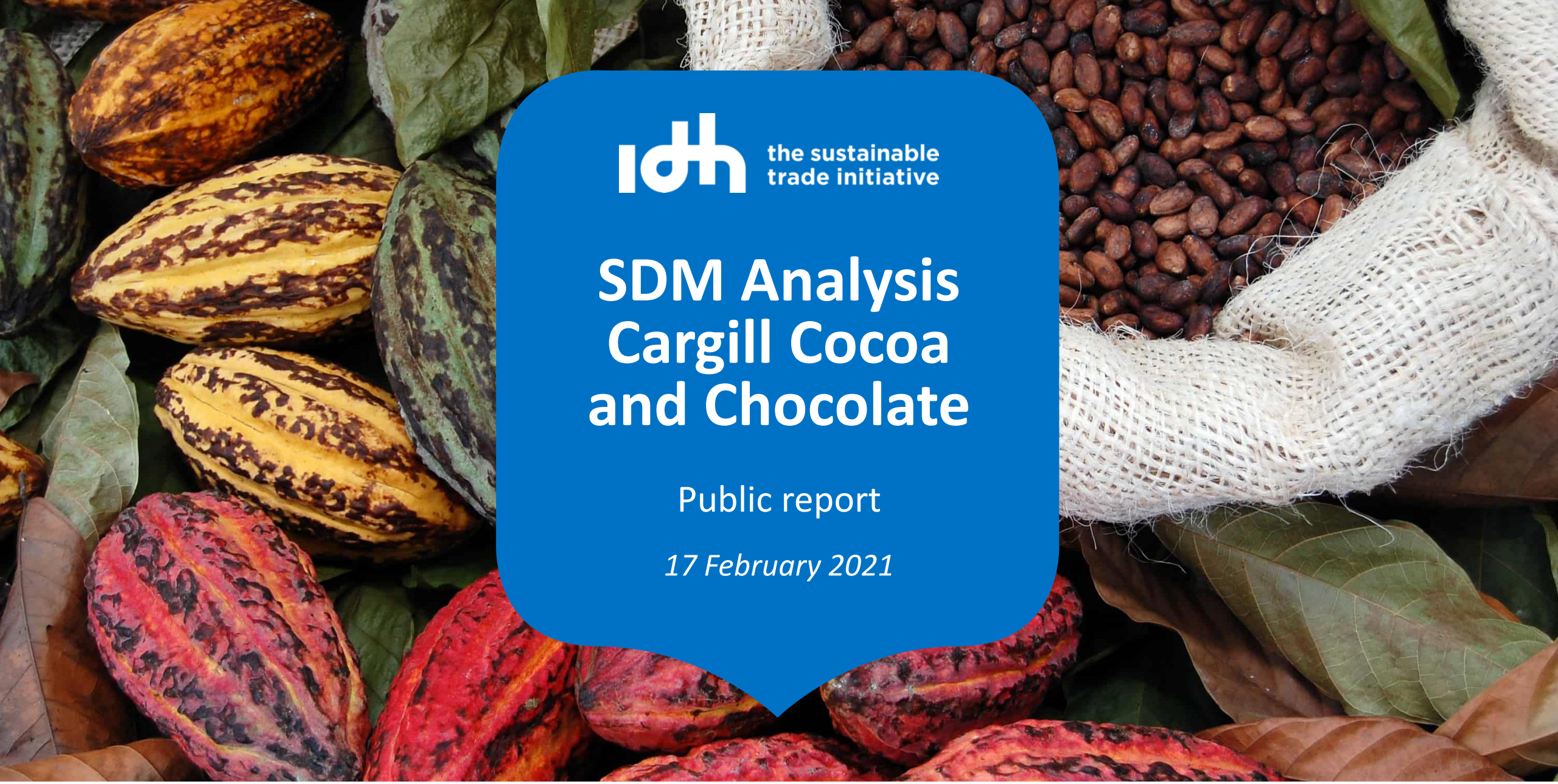


SDM Analysis Cargill Cocoa and Chocolate

Public report

17 February 2021

IDH Introduction

Introducing to the Service Delivery Model (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 catalyse innovations in service delivery that positively impact people, planet, and profit.

Thanks

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

EXECUTIVE SUMMARY

Executive summary

Cargill Cocoa and Chocolate (Cargill) is an established company and has been sourcing cocoa beans from smallholder farmers in Ivory Coast since 1997. The company is looking holistically at cocoa farmer household income to reduce the risk of farmers moving away from cocoa cultivation because cocoa farmers are not earning sufficient income from cocoa to have a clear incentive to continue cultivating cocoa in the long-term, nor to invest in their cocoa plantation.

The cocoa market is strictly regulated by the Conseil du Café-Cocoa (CCC), with regulations and policies on cocoa sales-price, productivity and disease eradication. Smallholders are currently negatively affected by COVID-19 in addition to the continuous effects of climate change, aging cocoa-trees and the spread of the Cacao Swollen Shoot Virus Disease (CSSVD). The latter three cause increasing pressure on cocoa productivity and are taken into account in the Segmentation for this SDM study.

This study sets out the most important recommendations for Cargill Cocoa and Chocolate to effectively increase the livelihood of the smallholders it sources from, in order to sustainably secure its cocoa supply. These recommendations are structured along three main topics: (1) increasing farmer income from cocoa, (2) increasing farmer income from other sources, and (3) strengthening cocoa cooperatives.

1. Supporting farmers in securing a higher income from cocoa within the boundaries set by the CCC, is imperative for farmers to continue cultivating cocoa in the long-term:
    - Cocoa farmers continue to require support on cocoa farming from Cargill, as incomes are too low to justify investments in cocoa plantations
    - The rules of the CCC limit the possibilities to support farmers in increasing their cocoa income by increasing productivity, so other routes to increase income are to be explored
    - Swollen shoot and plantation age should trigger the planned renovation of cocoa plantations to avoid net income declining beyond a point of no return
2. Strategic diversification will only enhance farmer incomes if the approach is well designed, effectively implemented, and efficiently financed:
    - A careful selection of adequate income-generating activities per cooperative to complement cocoa income is critical to the success of Cargills diversification approach
    - For the diversification approach to be effective, Cargill needs to ensure that all critical services are provided to farmers and cooperatives
    - For the diversification approach to be efficient, the costs and benefits of the expanded Service Delivery Model should be shared in a way that is financially sustainable for all commercial SDM actors
3. Continued investment will result in professional cooperatives that can play a key role in a service delivery model that is sustainable in the long run:
    - Cargill can channel its investments strategically through cooperative categorization and development
    - Adequately incentivized cooperatives will be willing to scale up their role in the service delivery model
    - Adequately supported cooperatives will be able to scale up their role in the service delivery model

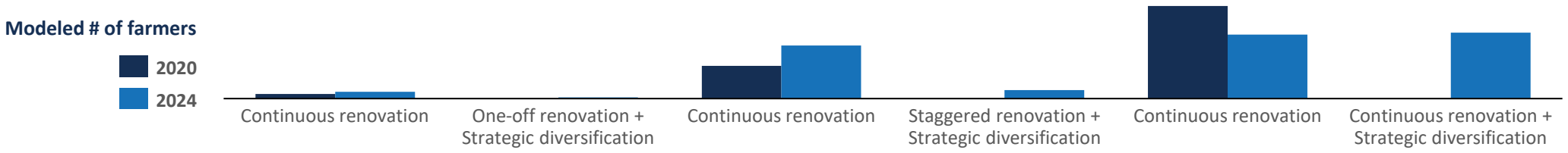
The results of this study show that current service delivery by Cargill to cocoa farmers can have a significant positive impact on farmer livelihoods, but that more is needed. This is exacerbated by the temporary CCC limitations on supporting further productivity increase, as well as the growing number of farmers that needs to plan for the immediate or gradual renovation of their cocoa plantation. This study supports Cargill in looking at other income drivers through which to support farmers in increasing their livelihoods.

Strategic diversification is explored in detail and this study confirms the importance of the careful design of such interventions: the strategic diversification approach developed for members of the example cooperative in Central Ivory Coast is not expected to enhance farmer net income, but rather to significantly decrease it. This is mainly due to significant external labor that would be required and limited finance available to invest in innovations. However, when combined with the potential positive impact on the cooperative income, it becomes clear that there is room for the costs and benefits of this example approach to be distributed more evenly between farmers and the coop.

Key farmer segments

Farmers were segmented according the need for renovation due to the prevalence of swollen shoot in a farm or a high average tree age, to assess the impact of strategic diversification in different contexts

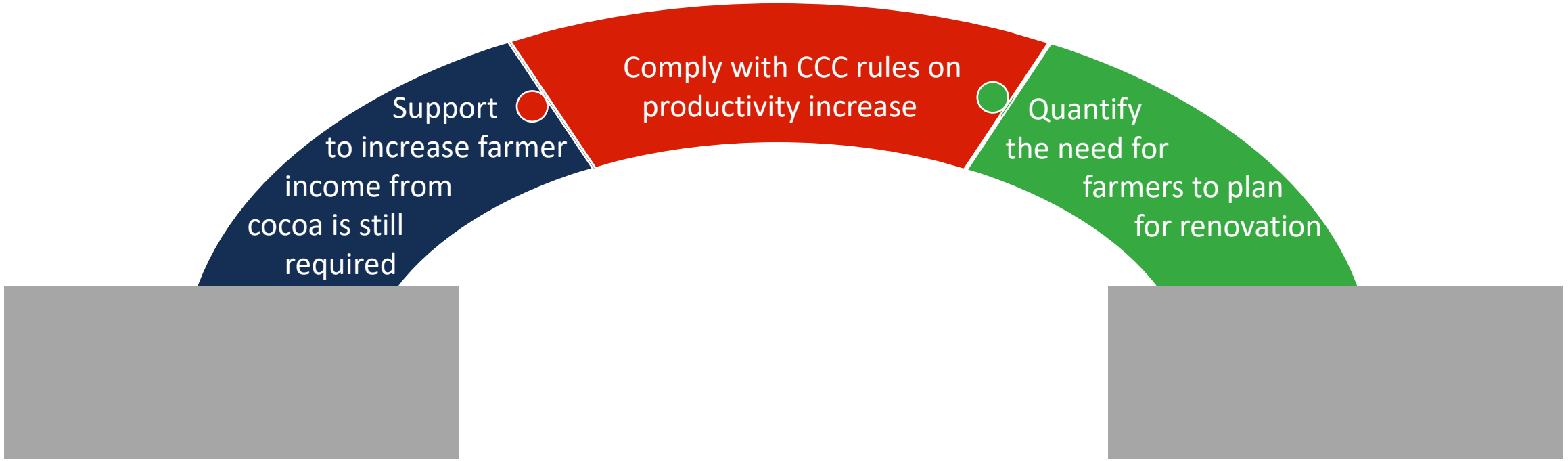
	Swollen shoot		Aged trees		Young trees	
Shared characteristics	• Farm size 6.7 ha, of which 52% cocoa, 15% non-cocoa, and 33% fallow land • Tree density 1,222/ha • Part of Cargill's farmer portfolio					
Description	Farm affected by swollen shoot (CSSVD), and thus needs treatment and renovation of affected plantation		Farm is CSSVD free, but cocoa trees are old, and thus the plantation needs renovation		Farm is CSSVD free and cocoa tree are young, so there is no need of treatment or renovation	
Segment code	**1A**	**1B**	**2A**	**2B**	**3A**	**3B**
Key characteristics	• Start yield 677 kg/ha, tree age ~26 years		• Yield 421 kg/ha, tree age ~33 years		• Start yield 1,071 kg/ha, tree age ~16 years	
Renovation	3%/yr	100% in yr 1	3%/yr	20%/yr in yr 1-5	3%/yr	3%/yr
Diversification	Conventional	Strategic	Conventional	Strategic	Conventional	Strategic
Services	Cocoa	Cocoa & diversification	Cocoa	Cocoa & diversification	Cocoa	Cocoa & diversification



CORE ANALYSES

Increasing farmer income from cocoa

1. Supporting farmers in securing a higher income from cocoa within the boundaries set by the CCC, is imperative for farmers to continue cultivating cocoa in the long-term

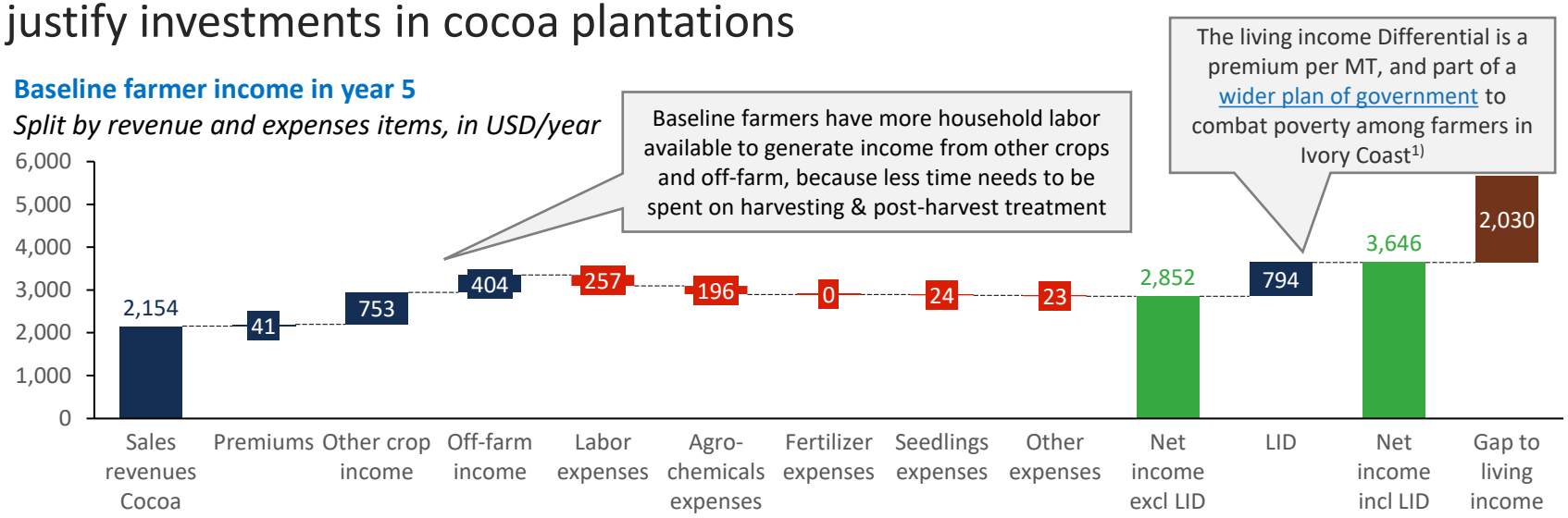


Support to increase farmer income from cocoa is still required

1.A. Cocoa farmers continue to require support on cocoa farming from Cargill, as incomes are too low to justify investments in cocoa plantations

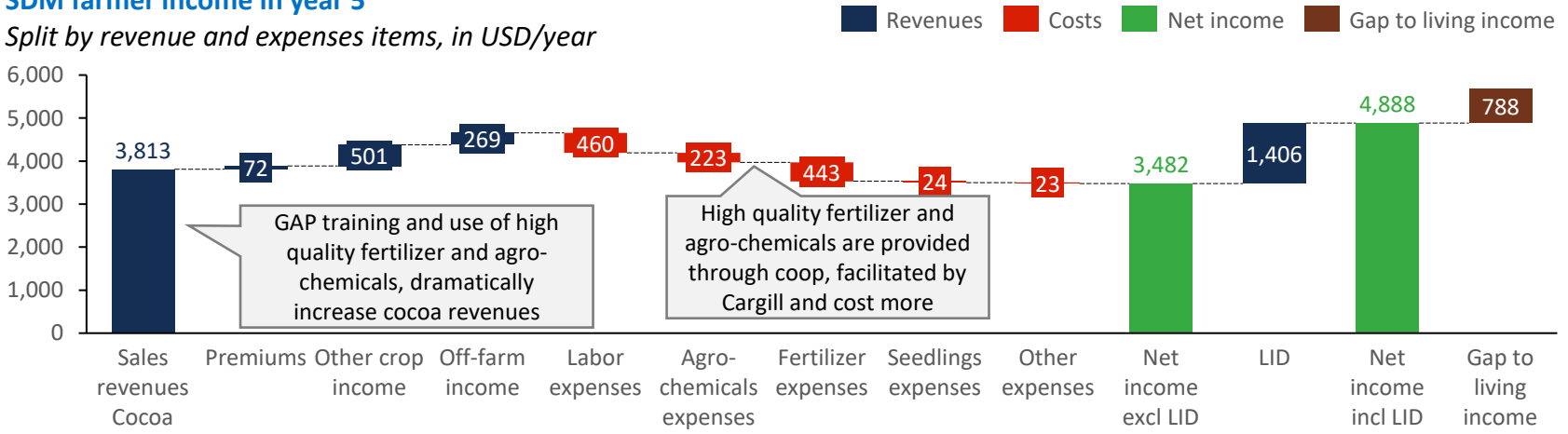
Baseline farmer income in year 5

Split by revenue and expenses items, in USD/year



SDM farmer income in year 5

Split by revenue and expenses items, in USD/year



Baseline vs SDM farmer

- The farmer incomes on the left indicate that neither a Baseline farmer, nor an SDM farmer currently generate a living income, and therefore are not expected to be able to make any sort of investments in their cocoa plantations that would benefit the long-term security of supply of cocoa to Cargill (ie. Renovation at scale)
- [redacted]
- [redacted]
- [redacted]

Sources: 1) Reuters (2019) 2) LiCoP/Anker (2020)

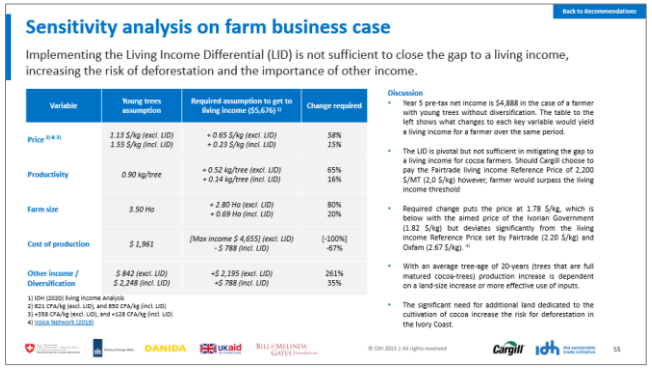
Comply with CCC rules on productivity increase

1.B. The rules of the CCC limit the possibilities to support farmers in increasing their cocoa income by increasing productivity, so other routes to increase income are to be explored

We have explored the farmer net income from the perspective of the five main drivers of **farm gate price**, **productivity**, **farm size**, **cost of production** and **other income**, and demonstrate the changes required in each of these drivers for a farmer to reach a living income. Productivity enhancing services have been temporarily limited by the Conseil du Café-Cacao (CCC), which has led Cargill to temporarily seize the provision of cocoa seedlings for renovation to its farmers.

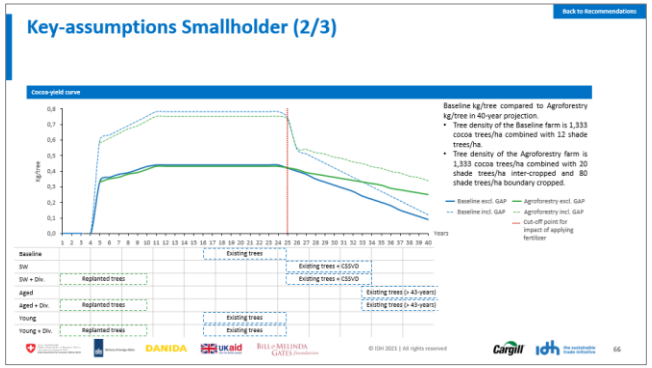
Drivers of farmer net income

- Of the five main drivers of farmer net income, the cost of production and farm size are not explored as they don't have the potential to play a significant role in closing the gap with a living income
- Price and productivity are explored in more detail on this slide
- The other income driver is explored in detail in the next section of this report



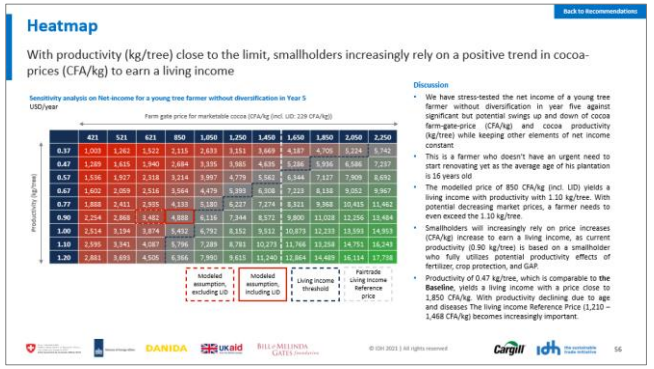
Productivity

- Although seedlings are no longer provided, Cargill continues to work with coops at ensuring that farmers have access to high quality fertilizer, but this is only considered to have impact until trees reach 25 years of age
- As an important portion of Cargills farmers has a plantation with an average age of over 25 years, we explore in the next slide what type of support farmers would require to renovate their plantations and keep cultivating cocoa



Farm gate price

- Without the option of supporting farmers with phased renovation of their cocoa plantations, we need to assume that productivity will decline for this portion of farmers with aged plantations
- The heatmap below shows the price that would be required to compensate for declining productivity. Under current assumptions the Fairtrade Living Income Reference Price would bring the farmer income to above the living income threshold

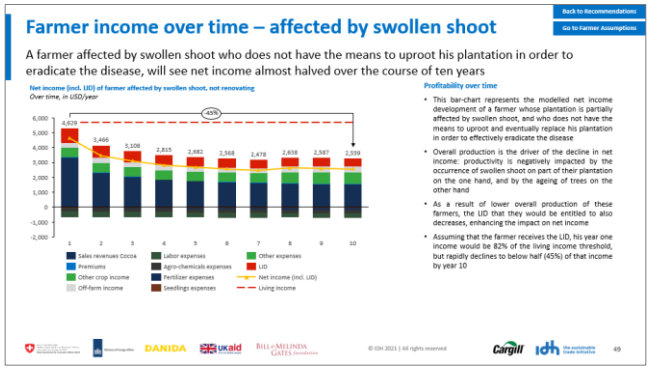


Quantify the need for farmers to renovate

1.C. Swollen shoot and plantation age should trigger the planned renovation of cocoa plantations to avoid net income declining beyond a point of no return

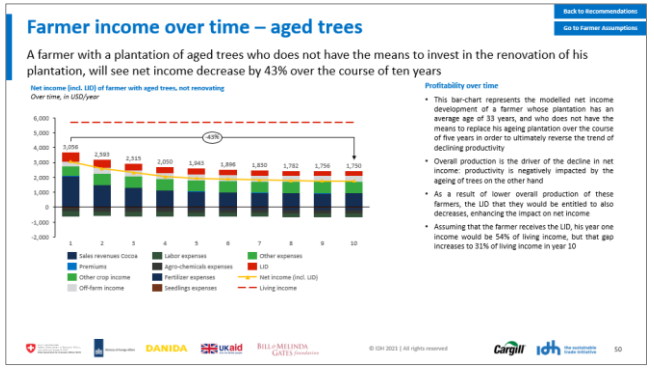
29% of Cargills farmers in 2020 have plantations of which the average age is higher than 25 years. Swollen shoot and plantation age are both critical triggers for renovation, but renovation should be approached differently in both cases in order to be effective. The CCC currently prohibits companies like Cargill from supporting farmers with renovation. In this slide we quantify the financial gap that emerges when farmers would renovate in order to continue cultivating cocoa in the long term, and explore at high-level what a sector-wide initiative could look like to secure access to adequate financing.

Swollen shoot



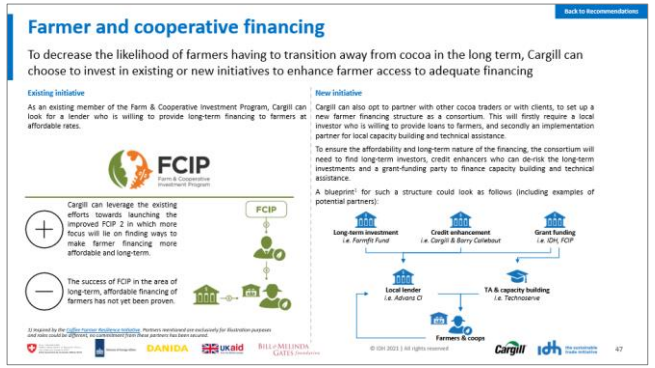
- Farmers affected by swollen shoot need to uproot their entire plantation if the disease is to be eradicated. The alternative of not renovating leads to a decrease of income, further increasing the likelihood of a transition away from cocoa in the long term
- Current financial support by the government seems insufficient to convince farmers to renovate their plantations entirely. Farmers require access to **affordable, long-term financing**, and access to temporary **alternative sources of income** to afford full renovation

Aged trees



- Farmers with an aged plantation ideally starts renovating his plantation according to a staggered approach to avoid a situation in which he is forced to transition away from cocoa in the long term
- The objective of staggered renovation is to dampen the depth of the valley of death[1)] and to ultimately break the trend of declining productivity
- Farmers require access to **affordable, long-term financing**, and access to temporary **alternative sources of income** to afford staggered renovation

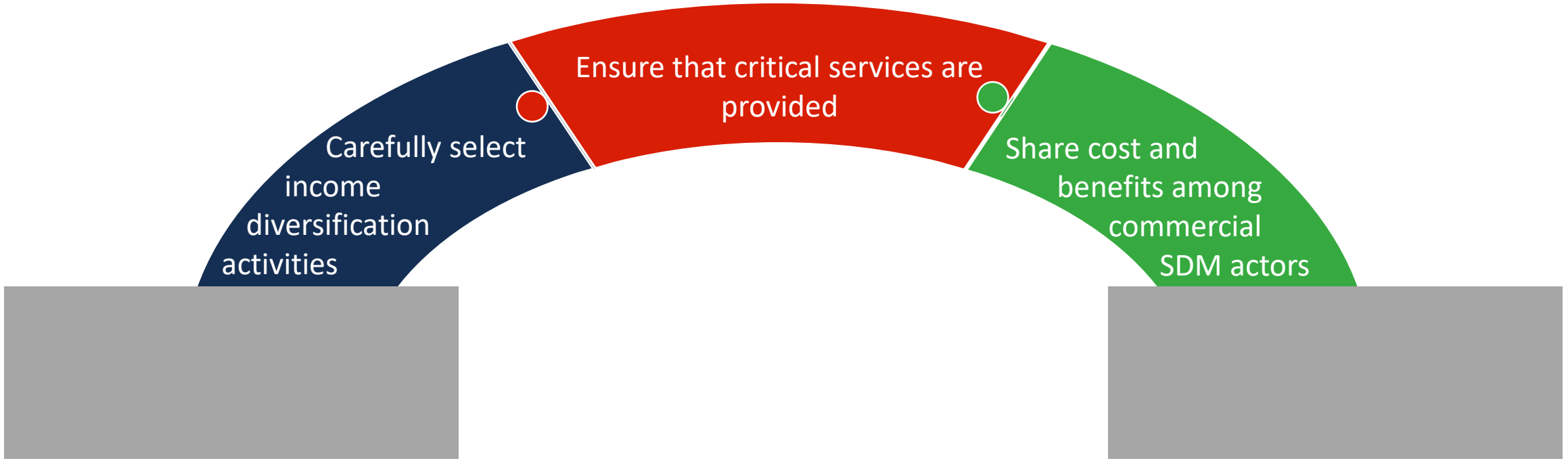
Given the persistent nature and scale of this challenge, it is considered unrealistic to expect Cargill to address this need for adequate financing independently. We therefore encourage Cargill to invest in existing or new sector-wide approaches aimed at innovative structures for securing farmer access to adequate financing.



1) The timeframe of several years in which hardly any income can be generated from a renovated plantation within a very short period

Increasing farmer income from non-cocoa activities

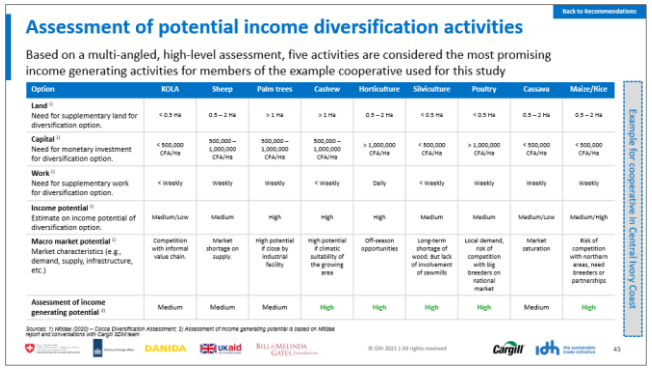
2. Strategic diversification will only enhance farmer incomes if the approach is well designed, effectively implemented, and efficiently financed



Carefully select income diversification activities

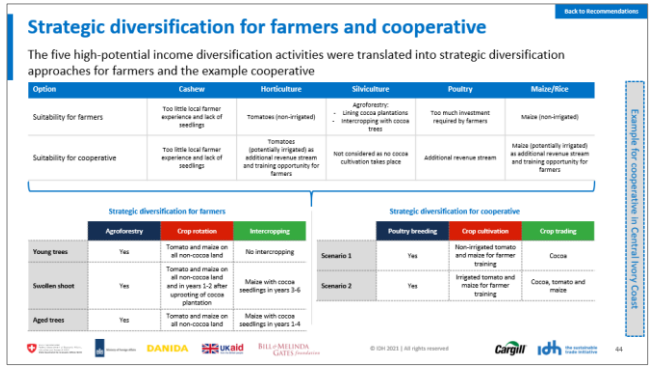
2.A. A careful selection of adequate income-generating activities per cooperative to complement cocoa income is critical to the success of Cargills diversification approach

1. Assess potential income-generating activities



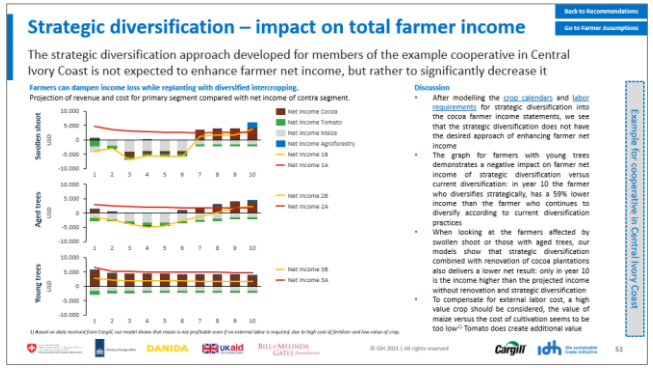
Nitidae (commissioned by Cargill) conducted a market assessment at cooperative level to assess potential income-diversification activities for cocoa farmers in Ivory Coast. One cooperative was selected as an example for the purpose of this study.

2. Shortlist most suitable activities for farmers and coop



The five high-potential income diversification activities coming out of the Nitidae assessment were translated into strategic diversification approaches for farmers and the example cooperative.

3. Model impact on cocoa farmer income



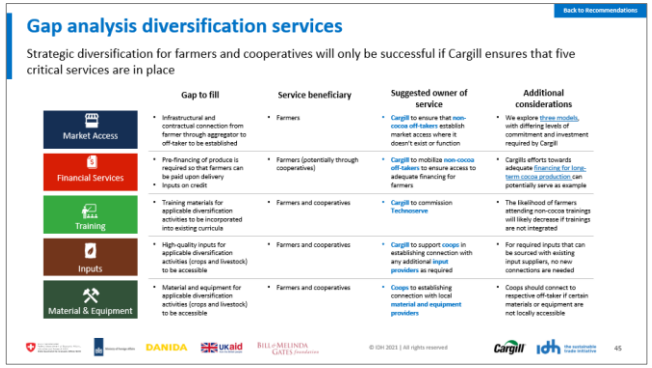
Our models show a **lower** net income all farmers who diversify according to the example strategic diversification approach. The cost of external labor required, is too high for the value created by the non-cocoa crops.

Example for cooperative in Central Ivory Coast

Ensure that critical services are provided

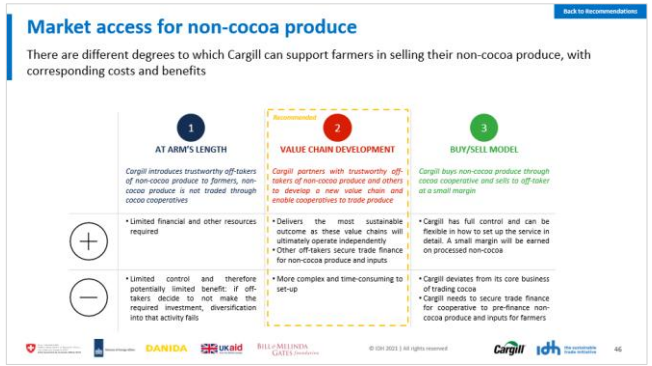
2.B. For the diversification approach to be effective, Cargill needs to ensure that all critical services are provided to farmers and cooperatives

Expanding the scope of existing services will be required for income diversification activities to lead to an increase in farmer income. A gap analysis between existing (including paused) cocoa services provided or facilitated by Cargill on the one hand, and critical non-cocoa services on the other, shows that investment is needed to come to a blended service delivery package for farmers to be successful in their income diversification activities.



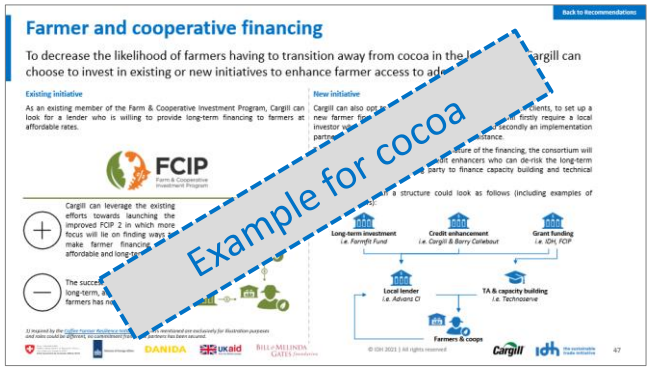
Gap analysis

Of the five diversification services we consider critical, we expect that three require some but limited investment by Cargill. However, market access and financial services for non-cocoa produce are expected to be the most challenging and require Cargill's additional commitment to be realized.



Market access for non-cocoa crops

There are different degrees to which Cargill can support farmers in selling their non-cocoa produce, with corresponding costs and benefits. We recommend Cargill to aim for a high investment/high return option, which is to drive the development of independent value chains for non-cocoa produce and mobilize the cocoa cooperatives to bring the produce to market.



Financial services for non-cocoa crops

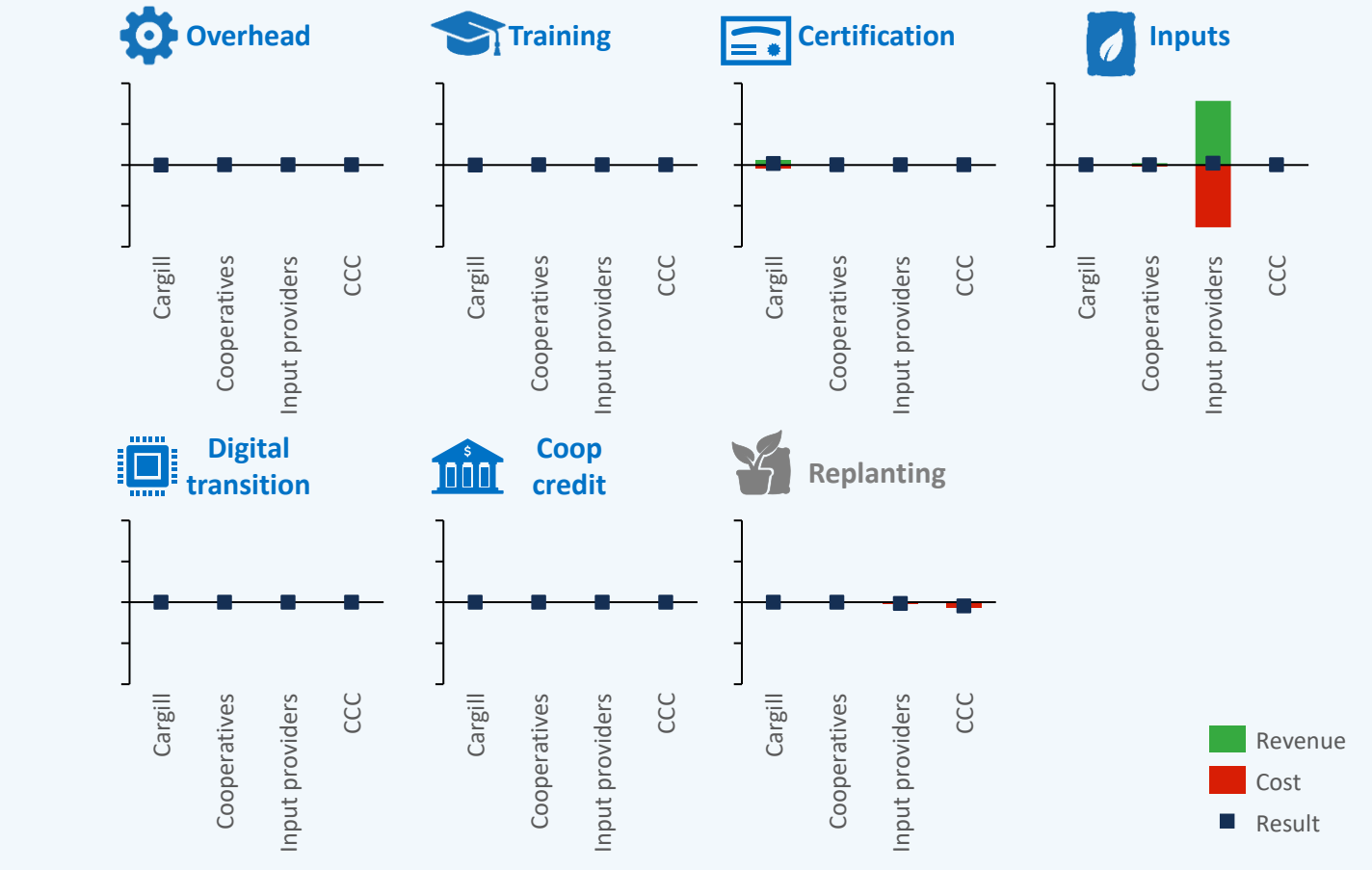
We have argued the need for Cargill to continue searching for ways to enhance farmer access to adequate financing for their operations. Cargill has a role to play in ensuring access to adequate financing for farmers diversifying into non-cocoa crops, by mobilizing the non-cocoa off-takers to do the same.

Share cost and benefits with coops

2.C. For the diversification approach to be efficient, the costs and benefits of the expanded Service Delivery Model should be shared in a way that is financially sustainable for all commercial SDM actors

Service profitability per service and per SDM actor

Annual averages in M USD over 2020 - 2024

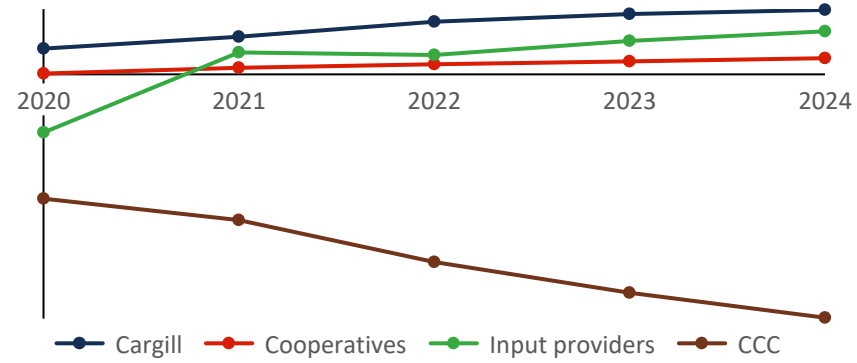


Financial sustainability

- This slide represents the hypothetical service profitability per service and per SDM actor. Costs of three out of five critical diversification services have been included: Training, Inputs, Material & Equipment. The cost of Market Access and Financial Services are currently unknown and would primarily be borne by the off-takers of non-cocoa crops
- Cargills profit is driven primarily by the certification premiums
- Cooperatives and input providers make a net profit from the start and year 1 respectively, whereas CCC clearly invests in the cocoa industry

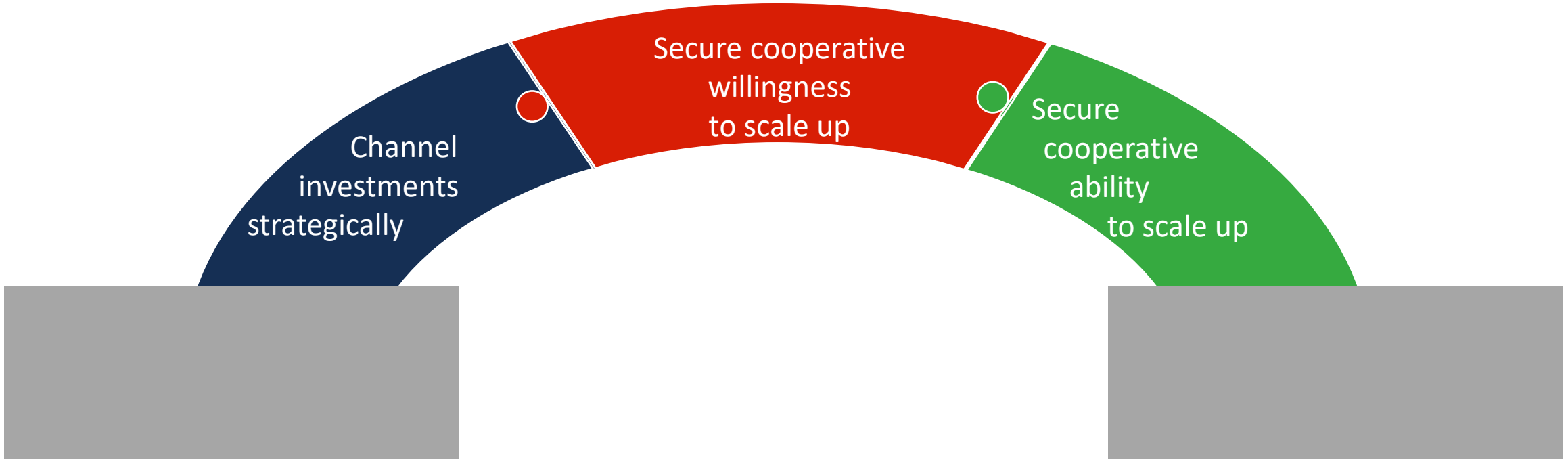
Hypothetical service profitability per SDM actor over time

In M USD/year



Effectively professionalize cooperatives

3. Continued investment will result in professional cooperatives that can play a key role in a service delivery model that is sustainable in the long run



Channel investments strategically

3.A. Cargill can channel its investments strategically through cooperative categorization and development

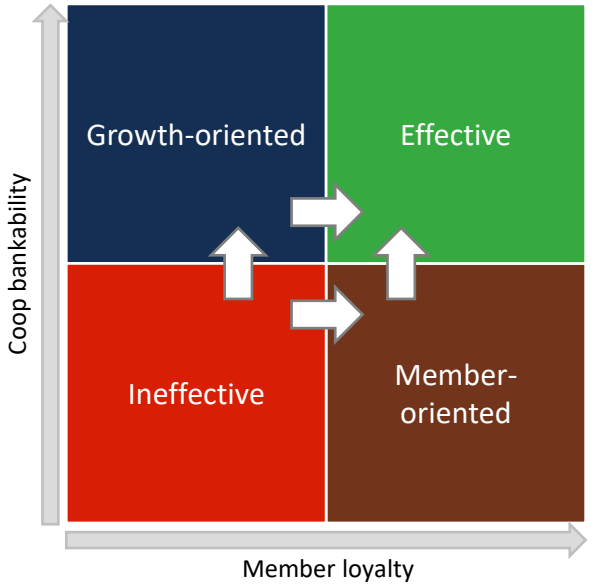
In order to secure effective service delivery in Côte d'Ivoire to the current scale of 130,000 smallholder farmers, Cargill requires a highly efficient and effective last mile delivery mechanism. Farmer cooperatives for cocoa have historically been considered the most logical entity to fulfil that role and Cargill continues to invest in the maturity of cooperatives.

For the purpose of this study, we assume that Cargill considers a cooperative effective when (1) it is in a position to raise the required trade finance independently from Cargill[1)], and (2) the coop provides a holistic set of services to its members aimed at facilitating strategic income diversification[2)]. For most cooperatives today this is a big step and for that reason we recommend Cargill to further formalize the **categorization** and **development** paths for cooperatives, and then to secure the willingness and ability of cooperatives to structurally play this critical role in Cargill's value chain.

Coop categorization and development

- We recommend Cargill to further develop their coop categorization model by incorporating indicators of the level of member loyalty and coop bankability so that periodic coop assessments lead to a plotting on a Coop Effectiveness Matrix
- To measure coop bankability, we suggest to use an estimated debt service coverage ratio of the cooperative, to measure member loyalty we suggest to use member transaction loyalty. Threshold values per category would need to be set
- A high-level set-up of such a matrix is suggested here, and is made up of four categories:
    - **Ineffective:** The cooperative is unable to secure adequate financing independently from Cargill, due to poor financial performance and ratios, weak governance. Member satisfaction is medium to low
    - **Member-oriented:** The cooperative is unable to secure adequate financing independently from Cargill yet. However, member satisfaction is high, indicating that the cooperative is effectively addressing holistic needs of cocoa farmers, thereby going beyond cocoa-related activities
    - **Growth-oriented:** The cooperative is able to secure adequate financing independently from Cargill, indicating that the cooperative operations are financially sustainable and able to absorb growth. However, member satisfaction is still medium to low
    - **Effective:** The cooperative is able to secure adequate financing independently from Cargill, and member satisfaction is high. This category of cooperatives is expected to be an effective entity in securing effective service delivery to Cargills portfolio of cocoa farmers and their holistic needs
- Assessment results would determine whether a cooperative has progressed sufficiently on either axis to be promoted to another category. Strategic support from Cargill is to be tailored to each category

Coop Effectiveness Matrix



1) It is understood to be Cargill's long-term ambition to move away from pre-financing the purchase of cocoa for coops on a large scale. As cooperatives become increasingly able to raise the required trade finance independently from Cargill, capital is freed up for Cargill that can be redirected to a next cohort of cooperatives as needed, but also allows the financially independent cooperative to finance its own growth and not be limited by the capital made available by Cargill. This development is also expected to significantly reduce the leverage which Cargill has over the cooperatives.

2) The underlying assumption that continues to apply is that Cargill needs cocoa farmers to increase their livelihoods in order to secure the long-term supply of cocoa. Strategic income diversification is explored in this study as one way of increasing farmer livelihoods.

Secure cooperative willingness to scale up

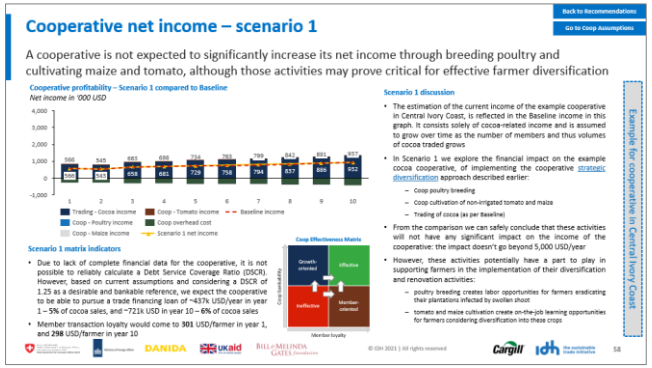
3.B. Adequately **incentivized** cooperatives will be **willing** to scale up their role in the service delivery model

We believe that the best way to incentivize a cooperative to expand its scope of operation is financially. For that reason, we have explored the potential financial impact of two scenarios and compared that to the baseline scenario in which the cooperative generates revenues solely from aggregating and selling cocoa. Scenario 1 below shows the impact of the cooperative breeding poultry as well as cultivating tomatoes and maize, while scenario 2 adds on to that the aggregation and sale of maize and tomatoes cultivated by their farmer members.

By strategically supporting cooperatives in expanding their scope of activities, Cargill can create a way for the cooperative to compensate for the cost of external financing. The main objective of Cargill's strategic support would be to allow the cooperative to create additional revenue streams. The message from Cargill to the cooperatives would run along these lines: *"We rely on you and your farmer members for our long-term supply of cocoa. We would like you as a cooperative to expand the scope of your activities because we strongly believe that expanding the scope of your activities will increase farmer livelihoods and help secure the long-term supply of cocoa. Your growth requires you to ultimately raise financing independently from Cargill, and we want to support you in securing additional income to (partially) off-set the cost of that financing."*

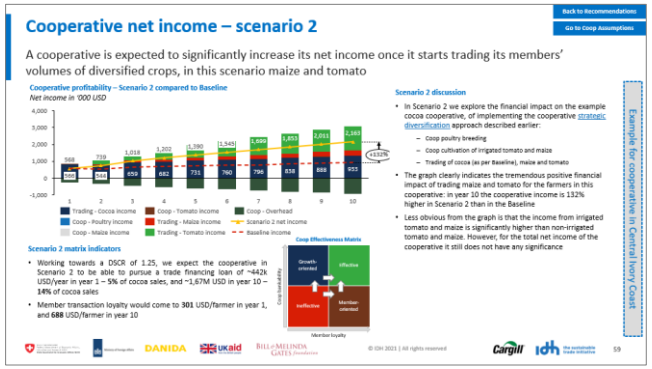
Scenario 1

A cooperative is not expected to significantly increase its net income through breeding poultry and cultivating maize and tomato, although those activities may prove critical for effective farmer diversification.



Scenario 2

A cooperative is expected to significantly increase its net income once it starts trading its members' volumes of diversified crops, in this scenario maize and tomato



Example for cooperative in Central Ivory Coast

Secure cooperative ability to scale up

3.C. Adequately **supported** cooperatives will be **able** to scale up their role in the service delivery model

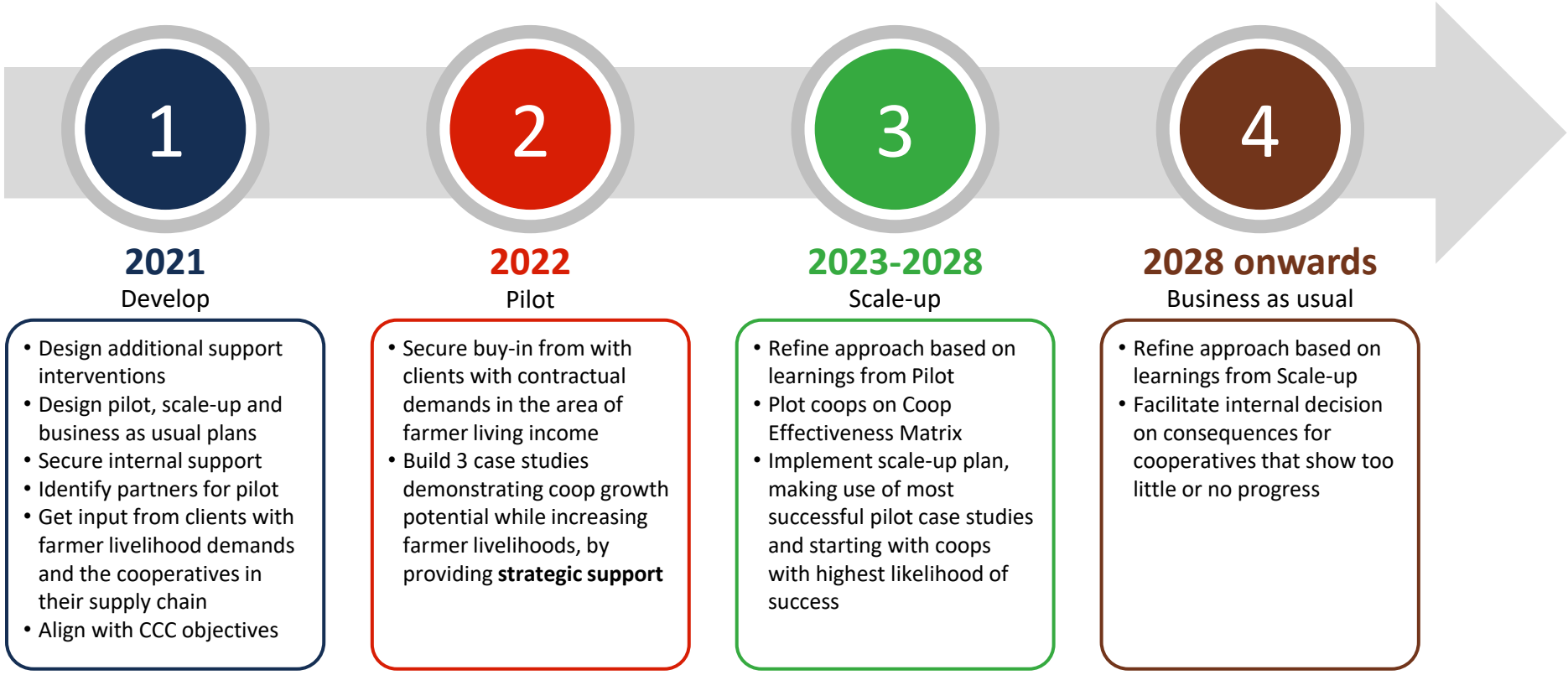
Cargill has a history of and is committed to investing in the capacity building of cooperatives through the Coop Academy program and pre-financing of cocoa. We believe that Cargill will need to selectively expand its capacity building efforts to cooperatives in order to secure the increase of farmer livelihoods. Below we provide a high-level suggestion of what such an expansion might entail.[1)]

The **strategic support**[2)] that we recommend Cargill to consider lies in three areas and should be aligned with the Coop Academy curriculum. Its disbursement should be tied to the result of the coop assessment against the Effectiveness Matrix:

a. Secure ownership by off-taker for non-cocoa commodity value chains, ie. demand, bank guarantees, supply chain infrastructure, loans to invest in required buildings, materials and equipment

b. Act as guarantor for bank providing trade finance for cocoa

c. Provide temporary human resources, ie. professional (financial) manager, field officer



1)It is important to note that these recommendations are based on conversations with Cargill and IDH stakeholders who are familiar with Cargills cocoa value chain in Ivory Coast, but it was unfortunately not possible for us to sense check our recommendations with one or more cooperatives, and the scope of our project prohibited us from designing the approach in more detail. For that reason, we propose that Cargill take sufficient time to develop its expanded cooperative capacity building approach.

2)Part of this support can be in the form of TA focussed on 1) bankability and access to finance (ie. Financial management coaching, raising internal capital) 2) diversifying coop services (ie. training, access to inputs, access to markets for new crops, etc)

CONTEXT

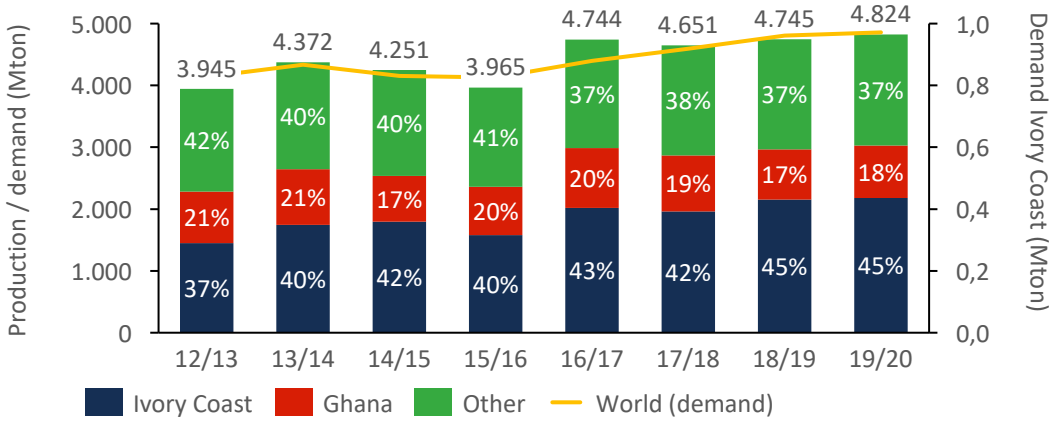
Introducing the cocoa sector in Ivory Coast

Market | Supply

Ivory Coast and Ghana cultivate most of world cocoa supply, and by setting a seasonal fixed farm-gate price Ivory Coast and Ghana combine efforts to increase smallholder income

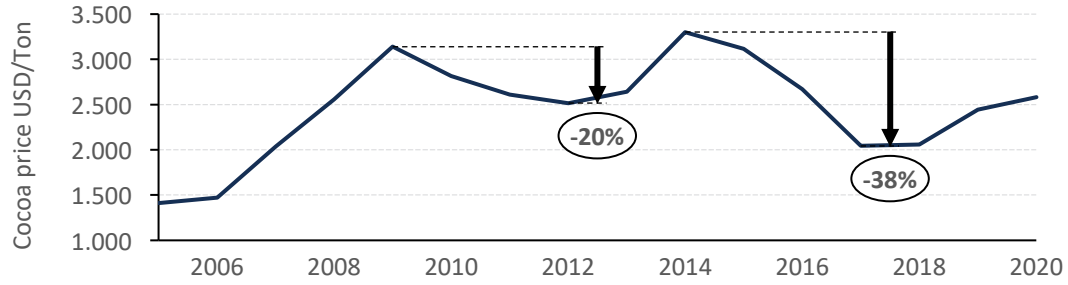
Surplus between supply and demand is present in multiple harvest periods.

Production and demand (Mton) of cocoa beans per country.[5)]



Cocoa prices are highly volatile with extreme drops due to over-supply.

Cocoa price in USD/Ton between September 2005 and September 2020.[4)]



State of the sector

- Since 2011, the Conseil du Café-Cacao (CCC) is responsible for the execution of the **price stabilization system**. Through a PVAM (Programme of Anticipated Sales) the CCC pre-sells 80% of the expected total harvest in the year before the harvest season starts, and the **farm gate price is fixed at 60%** of the value of this pre-sale. Every year in September, the CCC determines the farm gate price for the next year, and the allocation of subsidies to different parties in the cocoa supply chain as well as the amount of tax revenues.[2)]
- To **mitigate cross border selling** between Ivory Coast and Ghana, the cocoa price of both countries are set together. For season 2020/21, the price is set on $2,600 ton/kg[3)] of which $1,818 ton/kg reaches the farmer.[4)]
- Cocoa farmers in Ivory Coast **increasingly diversify their crop**, as cassava and plantain provide excellent possibilities for intercropping with young cocoa. Besides, pairing these crops provides additional income more regularly, in the cocoa off-season the households regard cassava and plantain as nutritious staple foods, and these crops often fit current gender roles within households.[1)]
- The **high cocoa price in 2003 and 2008** incentivized cocoa farmers to expand their cocoa plantations. As a result, the **price dropped extremely in 2012 and 2016** due to over production, as a cocoa tree needs 5 – 8 years to mature.[4)] However, the price increased in 2014 as a reaction to the increasing demand for cocoa from Asia.[6)]
- **Ivory Coast cultivates at least 40% of worldwide cocoa**. Combined with Ghana (neighbour country), they produce close to two third of world cocoa supply.[3)]

Sources: 1) KIT (2018); 2) AUAS (2018); 3) Reuters (2019); 4) Trading Economics (2020); 5) Statista; 6) Financial Times (2014); 7) Cargill (2020)

Market | Le Conseil du Café-Cacao (CCC)

Interventions by the CCC on price, productivity, and diseases are aimed to increase the resilience of the Ivorian cocoa industry for both smallholders and exporters

Goals

- Strengthen good governance, and develop a sustainable cocoa economy
- Secure income of producers by setting up a guaranteed minimum price as well as the improvement of internal and external marketing
- Establish a strong value chain based on credible producer organizations

Price Interventions

- CIF (Cost, Insurance and Freight) reference price is established by CCC at the start of every harvest
- CCC correction payment with exporters will take place if actual prices deviate from CIF
- CCC set a Living Income Differential, a fixed premium per tonne of cocoa. Funds raised by the (LID) will be used to help increase payments to farmers.

Productivity Interventions

- Limit exporters to directly provide yield enhancing services to smallholders (e.g. fertilizer, crop protection, etc.)
- Pause the collaboration with exporters and ANADER of providing seedlings through nurseries to smallholders

Diseases Interventions

- Establish land clearing programs to clear 100,000 ha of plantations infected with swollen shoot
- Incentive smallholder to clear plantations infected with swollen shoot with a grant and inputs.
- Strengthen knowledge of Swollen shoot in collaboration with ANADER.

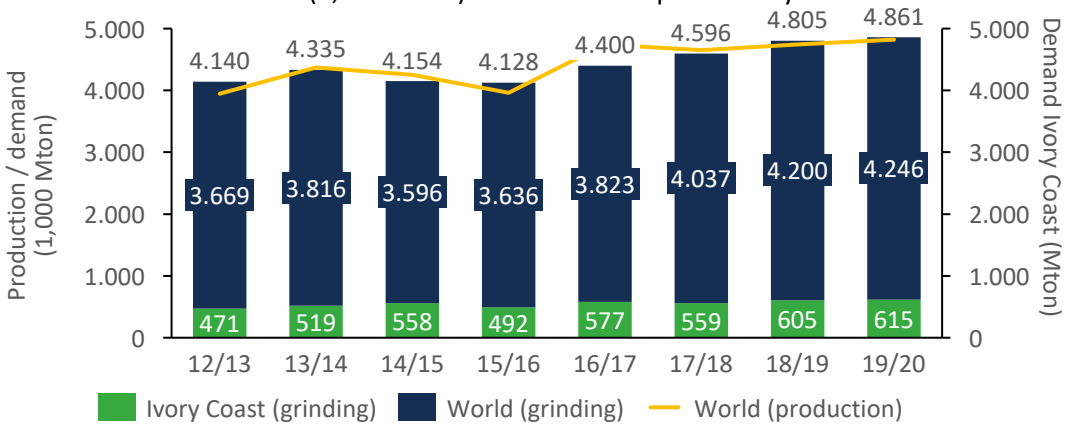
Sources: 1) CCC (2018) Projet nationale de lutte contre le swollen shoot; 2) CCC (2012) Reforme de la filiere Conseil Cafe-Cacao; 3) CCC (2015) Decree No. 2017-321 of May 24, 2015; 4) Business & Human Rights Resource Centre (2019)

Market | Demand

Local Ivorian grinding capacity and demand will increase, while worldwide demand for cocoa is expected to recover its upward trend from 2021 onwards after a decrease due to COVID-19

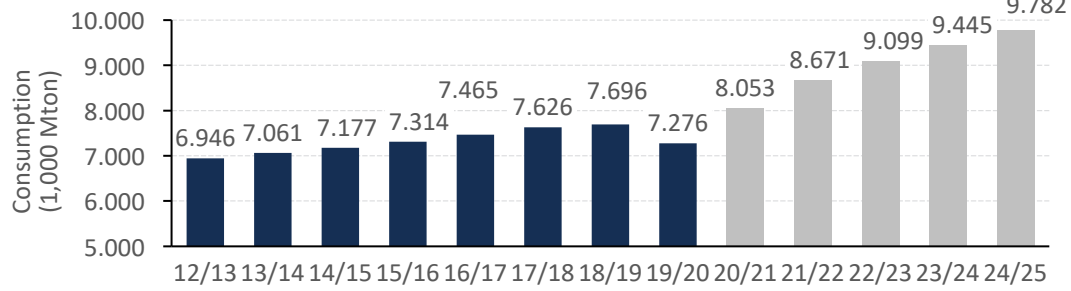
Surplus between supply and demand is present in multiple harvest periods.

Production and demand (1,000 Mton) of cocoa beans per country.[5)]



Worldwide consumption is affected by COVID-19 but recovers from 2021 onwards.

Retail consumption of chocolate confectionery worldwide between 2012 and 2025



State of the demand

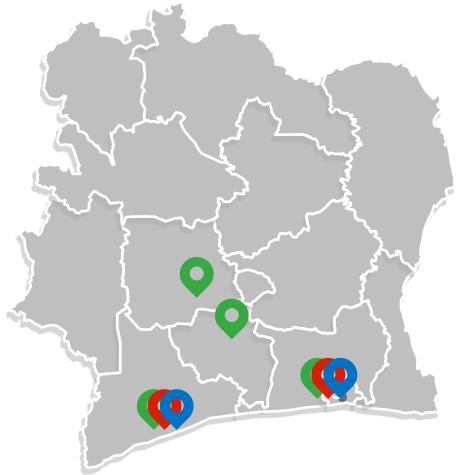
- Chocolate **demand relates to grinding** (processing cocoa bean to cocoa liquor, butter, cake and powder) **and consumption** of the processed produce.
- The majority of cocoa beans is grinded in Europe while **only +/- 10% is ground locally in the Ivory Coast**. However, cocoa processors and the Ivorian government are **expanding the Ivorian grinding capacity** in response to CCC's 2016-2020 National Development Plan. [5), 7) & 10)]
- **Cargill announced in 2019 to invest USD 100 mln. in expanding its cocoa processing sites in Yopougon (Ivory Coast)**, and an additional USD 7.7 mln. in sustainability and supply chain traceability programs. [9)]
- Exporters are hesitant to significantly increase their grinding capacity, as it might lead to more competition to source cocoa from smallholders. [8)]
- World **consumption of cocoa is expected to decrease due to COVID-19** but will **recover its annual growth of ~4%** in following years.

All major cocoa grinders have factories in Abidjan and San-Pedro.

Location of cocoa grinding factories of three major cocoa grinding organizations.

Legend

- Cargill factories
- Barry Callebaut factories
- OLAM factories



Sources: 1) KIT (2018); 2) AUAS (2018); 3) Reuters (2019); 4) Trading Economics (2020); 5) Statista; 6) Financial Times (2014) 7) Barry Callebaut (2019); 8) Cargill, 08/10/2020; 9) Cargill – Invests (2019); 10) Reuters (2020)

Enabling Environment | 1/3

Low digitalization of transactions, decreasing yields due to climate change and low availability of affordable labor provide high potential impact areas of digitalization and adequate service provision.

Definition	Situation	Implications on SDM
Technology	**Low digital payment levels** | Currently, only 10% of farmers are being paid digitally for their cocoa through a formal procurement system; rest are paid with cash-on-delivery.[1]	• This makes the enforcement of minimum farmgate price payment by middlemen/traders very difficult as payments are hard to track. • This also reduces farmers' access to favorable formal credit as they lack verifiable financial records. • It presents dangerous conditions for cooperative leaders who withdraw and travel distances with large sums which leads to roadside robbery.
Environment	**Climate change** | cocoa farming in north-east is significantly affected by prolonged dry season, increasing temperatures and changes in rainfall pattern and quantity. Furthermore, farmers may increasingly move to areas located in the forest-rich south-western regions of Cote d'Ivoire (Bas-Sassandra region) due to its more favorable climatic conditions for future cocoa production.[2] **Deforestation** | Increase in cocoa production has led to a significant protected forest areas coming under cocoa cultivation. Currently, only 10.6% of the country remains forested.[4]	• Uptake of drought-tolerant and climate-resilient varieties[3] of non-cocoa crops will increase in importance. • The importance of the Bas-Sassandra region as sourcing region increases. At the same time, the land and forestry resources in this region will face a threat from increased cocoa activity.
Labor	**Availability and affordability** | Studies suggest that labor availability and affordability is a challenge, due to the availability of alternative earning options for the labor force. Also, higher wages are expected for higher intensity of the work, which is the case in cocoa farming. However, the cocoa households are reluctant to meet laborers' wage demands.	• This means, while labor cost/FTE remains high, farmers are expected to engage limited hired labor to minimize total labor expenses. Furthermore, adoption of farming practices & technologies that optimize labor requirement can improve farmer incomes. • Cooperatives can play a key-role in providing professionalized labor services to farmers. The labor services often consists of youth of farming households, which can be a lucrative income generating activity (IGA) for the HH.

Sources: 1) World Cocoa Foundation (2020) 2) KIT (2018) 3) CORAF (2018) 4) Mighty Earth (2018) 5) Dalberg (2015)

Enabling Environment | 2/3

Lack of (in)formal finance increase the present challenge to access quality inputs, while low land tenure decreases farmers' incentive to invest in rejuvenation / diversification

Definition	Situation	Implications on SDM
Inputs	**Fertilizer** | Only 12-15% of cocoa farmers use fertilizers (Cargill: 25%-30%). Fertilizer uptake by farmers is a strong function of their purchasing power. This is inline with the observations across past SDM analyses (by IDH in Cote d'Ivoire cocoa) that fertilizer is the biggest farming cost. Furthermore, inefficient fertilizer usage and limited availability, affordability, and low quality of fertilizer formulation have been identified as key farmer challenges. **Renovation and rehabilitation (R&R)**| Overall 30% of SHF land under cocoa cultivation needs renovation and 51% rehabilitation. The country-wide avg. age of cocoa trees is expected to be between around 16-25 (after 25 years, the tree productivity starts declining)[5].	• Improving the access and affordability of planting materials will become a key intervention, especially because only 10% of planting material needed to cover CDI's replanting need is available.[5] • Replanting and rejuvenation will greatly enhance the impact of services provided to farmers, such as GAP training, access to fertilizer, pesticides and other inputs.
Financing[1]	**Availability of credit** | Around a quarter of cocoa farmers take some kind of credit, mostly ranging between US$50 and US$250. In practice, the easiest way for cocoa farmer to get access to a small loan is through a local cocoa buyers, cooperatives or family/friends instead of through banks. Collateral is not often required when accessing such credit or, if it is, the value of a household's crops can be used as a guarantee. **Use of credit** | Loans are not sufficient to cover all requiring cost. School fees and household needs take precedence, resulting to provided credit not being used to purchase inputs or to hire labor.	• Access to formal and favourable credit may become a necessary service to support the additional (as compared to the baseline) on-farm investments of SDM farmers for replanting and diversification. • If coops transition towards diversified business models selling additional products, this could open the doors for females/youth in cocoa households to access investment capital (micro-loans)
Land tenure	Rural Land Tenure Agency (AFOR) has been established to identify and formalize the boundaries between rural villages, and to clarify the land property rights of rural landholders. However, the current land tenure system in Côte d'Ivoire is still regarded as complicated, costly, and outdated. As a result, farmers are reluctant to implement agroforestry or rejuvenation.	• Farmers' investment decisions in cocoa production are observed to be directly linked to land tenure arrangements and land security. Therefore, adoption of investment intensive interventions may be difficult among the farmers with uncertain land tenure.

Sources: 1) World Cocoa Foundation (2020) 2) KIT (2018) 3) CORAF (2018) 4) Mighty Earth (2018) 5) Dalberg (2015)

Enabling Environment | 3/3

Child labor is a persistent challenge with smallholders having limited ability, trust and incentive to use the current cocoa market infrastructure and potential

Definition	Situation	Implications on SDM
Trading system, pricing and competitiveness *(some aspects covered in the section on market)*	**Direct buyers from farmers**| Around 65% of cocoa is sold via small-scale collectors with little tradition of farmer loyalty to these traders. This has resulted in short-term and insecure contracts, and widespread side-selling. Though hard evidence is absent, it is an open secret that local traders regularly undercut the minimum farm gate price[6]. **Incentive for quality** | Fixed prices by CCC mean that price differentiation for better quality is not possible. However, premium payments for certified cocoa are possible[1].	• Managing farmer loyalty and developing long-term relationships will be a key challenge. Services and incentives to the farmers need to be ensured to mitigate this risk. • No quality premium creates the risk of race to the bottom in terms of quality.
Infrastructure and institutional stability	**Infrastructure** | The situation of public infrastructure, such as roads, ambulances, schools, extension services is still poor. A part of the cocoa revenues received by the CCC are reinvested in the sector and in general public goods. However, there is a perceived lack of transparency in decision-making and resource allocation[6]. **Distrust in institutions |** Like in the case of public investments by CCC, institutions such as formal cooperatives (covering 20% of the farmer base) and financial institutions are often perceived with mistrust by cocoa farmers. This inhibits the effective integration of farmers into formal systems[1].	• Inefficiencies in infrastructure are expected to drive costs and reduce the value distribution to farmers. • Transparency, good-governance and information sharing by institutions engaged in SDM may lead to increased farmer engagement.
Social norms	**Child labor|** Despite more than a decade of efforts, the numbers on child labor are still very high. Root causes – such as farmer poverty, absence of and access to good schools, inadequate local infrastructure, lack of awareness etc. – need to be appropriately addressed. However, it has also been shown that farms with higher productivity may increase child labor risk - as those farmers may rely more on household labor due to insufficient availability of hired labor/professional labor. **COVID-19 |** The coronavirus pandemic may exacerbate child labor practices because schools are closed to prevent the spread of the virus and monitoring groups are less able to circulate in at-risk communities. [7)] **Gender |** Please refer to the discussion in the section on gender	• Child labor is a potential risk for Cargill's SDM. Service provision to mitigate child labor root causes are typically best explored with suitable partners.

Sources: 1) KIT (2018) 3) CORAF (2018) 4) Mighty Earth (2018) 5) Ecookim (2015). World Agroforestry Centre "An Overview of Cocoa Production in Cote d'Ivoire and Ghana " 6) VOICE (2018) 7) *Cosgrove (2020)*

Farmer Base | 1/3

Despite many farmers growing a number of crops besides cocoa to complement their income, Ivorian cocoa farmer's household income remains significantly below the living income

Household profile

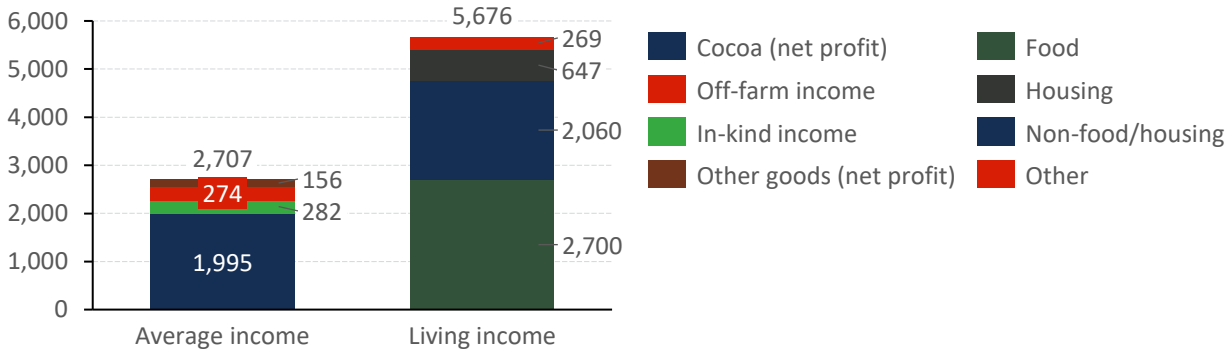
- In Ivory Coast, the average household consists of 7 persons, of which 4 adults, and 3 children. [2] The average age of the **household head is 45-50 years old**. [2]
- The average household income is USD 2,707 p/y (median USD 1,919 p/y) [1], which is **significantly below the living income** of 5,676 USD p/y [6], and **just above the extreme poverty** line of USD 2,276 p/y. [1] Cargill's observed HH-income is between USD 3,000 – 3,100 p/y. [3]

Agronomics & Price-setting

- An average farmer in Ivory Coast has a **farm area of 6.7 Ha, of which 4.9 Ha is dedicated to the cultivation of cocoa (Cargill = average 3.7 Ha)**. The average tree density is 1,348 #/Ha [1], and an average yield is 271 kg/Ha (Oct – Jan) and 82 kg/Ha (Apr – June). [2] **Cargill's observed annual yield is 560 kg/ha,** which is relatively high compared to Ivorian and other African cocoa cultivating countries.[4]
- The **average tree age in Ivory Coast is 16 years**. A Cocoa tree is fully matured after 8 years, with good yield until an age of 25 years, after which the tree is somewhat productive until an age of 40 years,. The average farm has 17% of trees < 5 years, 63% between 5 – 25 years, and 20% > 25 years. [2] [4]
- Contrarily to Cocoa, diversified crops are also used as food crop, and hence have a lower effect on a farmers' income and expenses. [2] Besides, **obtained diversified yields are low** and due to low cocoa-prices, farmers are **not incentivised to invest in their cocoa farm**. [3]
- Based on the set price for 2018/2019 (October 1, 2018), the **relationship between the producer price and the export price is shown in the below figure**:

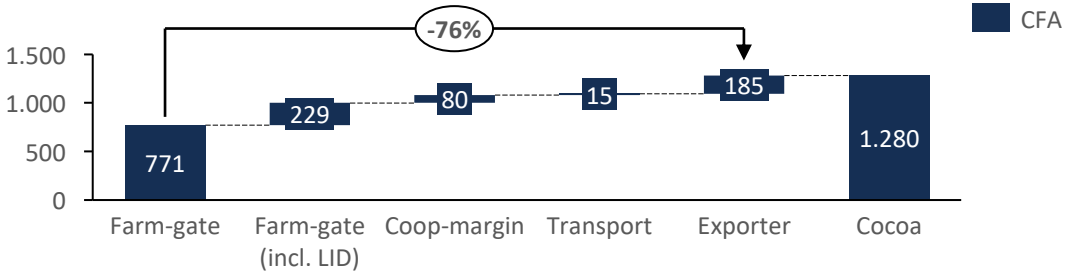
Ivorian cocoa HH earn significantly less than the living income

Average income and living income of an HH in Ivory Coast (USD/year).[1), 6), and 7)]



Significant price difference between farm-gate and exporter price.

Relationship between the producer price and the export price (CFA/kg).[4]



Sources: 1) True Price (2018); 2) KIT (2018); 3) Cargill, 08/10/2020; 4) The World Bank (2019) 5) Cargill (2020) 6) LiCoP/Anker (2020) 7) LiCoP/Anker (2018)

Farmer Base | 2/3

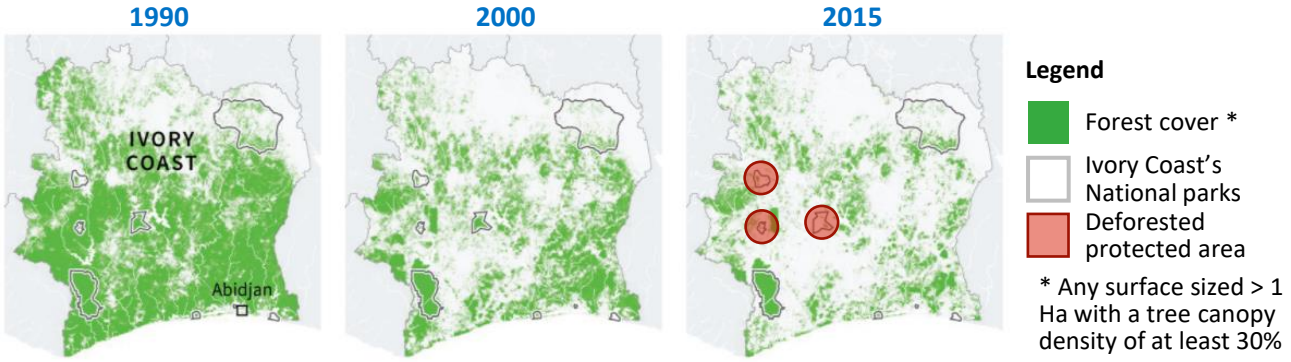
Cocoa cultivation area is expected to shift towards west Ivory Coast by 2050, increasing the risk of deforestation of limited remaining forest areas.

Suitable cocoa production area is expected to shift to west Ivory Coast.

Locations of Cargill farmer coops in Ivory Coast with best suited cocoa production indicated.[1) 2)]

Significant deforestation concentrates forest areas around Ivory Coast's National parks.

Forest cover in Ivory Coast per 1990, 2000, and 2015.[3)]



Characteristics

- Shown in the upper figure, the **best suited areas** to cultivate cocoa in Ivory Coast are in the **south east and south west** in 2013. By 2050 the best suited areas are expected **to move towards the south west of Ivory Coast**.[1)]
- Shown in the lower figure, the concentration of best suited area **leads to further deforestation of remaining forest covered protected areas** (e.g., Mont Peko, Goin Debe, and Cavally).[3)]
- The cocoa cu**ltivation regions in Ivory Coast have different characteristics** in terms of the cocoa cycle, available land, and infection rate of the Swollen shoot (shown in the below table).

Cocoa cultivation regions differ significantly.

Qualitative summary of regions' main characteristics.[4)]

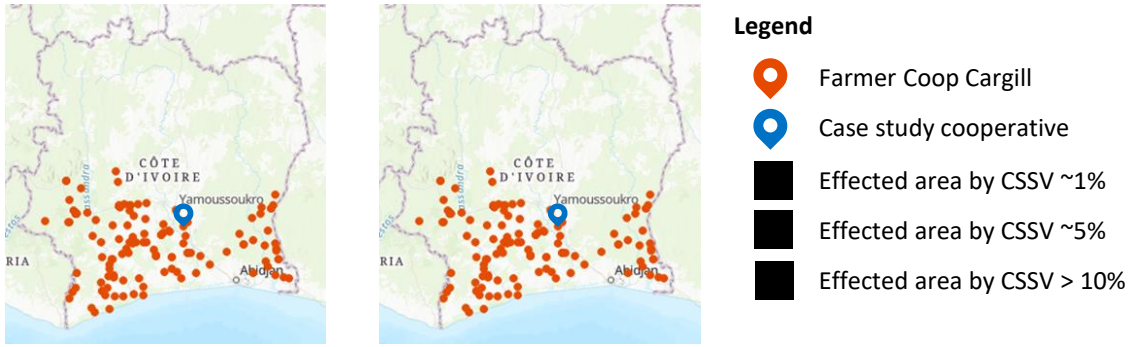
	Cocoa cycle	Land available	Perennial crops	Food crops	Swollen shoot
East	End 3rd	50%	Rubber & Palm	Rotation	Low
Center	Start 3rd	10%	Rubber & Palm	Rotation	High
West	End 1st / Start 2nd	< 1%	Rubber	None	Medium

Sources: 1) Läderach (2013); 2) Cargill data collection; 3) Reuters (2018); 4) Nitidae (2020) Cocoa Diversification Assessment;

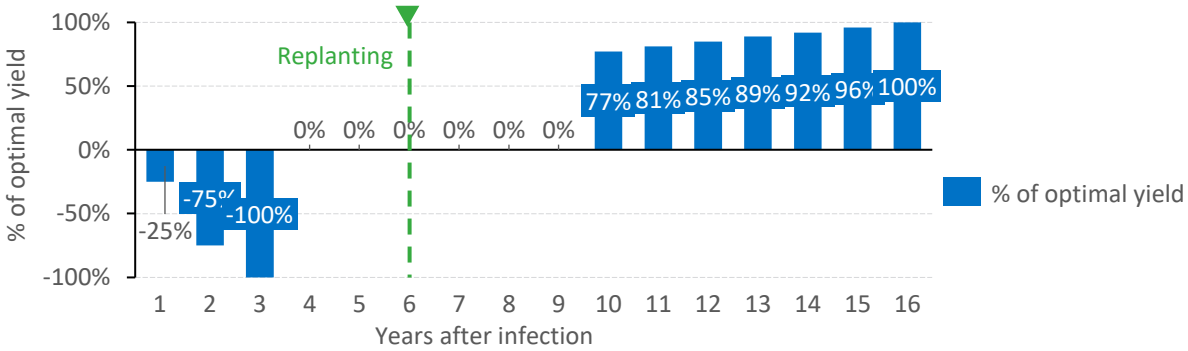
Farmer Base | 3/3

The Swollen shoot disease is a significant threat to the Ivorian cocoa industry with potential yield losses of up to 75% in two years on an infected plantation

Swollen shoot started in central Ivory Coast and is spread to all cocoa cultivating areas.
Area affected by CSSVD by 2007 and 2019 in Ivory Coast. [1), 2) & 14)]



Infected cocoa plants are able only able to increase their yield after 8 years.
Effects on cocoa-yield curve due to CSSVD in tree years and replanting after two (5th –year) in % change of optimal cocoa-yield curve. [8), 10)]



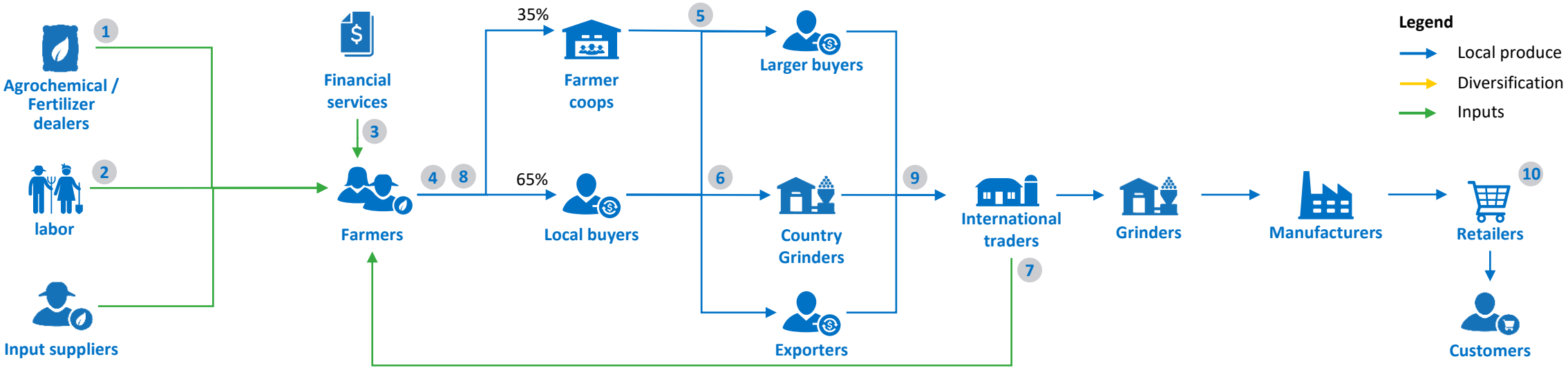
Development of Cacao Swollen Shoot Virus Disease (CSSVD)

- **The CSSVD is spread by the mealybug through 'radial spread'**(bugs that move along interlocking branches of adjacent trees), or though '**jump spread**' (bugs that move along the wind). [11)]
- The disease appeared in **central Ivory Coast in 2006 and 2007** in the regions of Bouafle, Sinfra and Oumé, with **more than 70% of plantations in the region being infected** causing production on those plantations to **decrease by about 60% between 2009 and 2017**. [1)] Moreover, CSSVD is spread severely in south west Ghana **infecting cocoa area in south east Ivory Coast**. [4)] Per 2018, **16% of Ivorian cocoa-farmers experienced losses** from CSSVD. [2)]
- **Ghana and Ivory Coast join efforts** to control the spread of CSSVD by cutting down 780,000 Ha of cocoa trees. Ivory coast started a program in **2018 to cut down 100,000 Ha of infected area**. With the help of funding from the African Development Bank, the Ivorian government provides an **incentive to farmers with inputs and a premium per Ha of cut-down infected cocoa area**. [2) 3)] However, the follow-up of smallholders is **lagging, as they don't see the incentive as sufficient**. [13)]
- To stop the spread of CSSVD, all infected and surrounded trees of an infected farm should be **completely removed, without the attempt of rejuvenation of the old roots**. [6)]
- **Barrier crops can help isolate the farm and trap mealybugs**. [5)] **Citrus and oil palm** barriers are the most effective in protecting spread. [7)] **Coffee and rubber trees are also suggested** to be used as barriers; however, these **are known to have negative effects on the cocoa-yield** due to e.g., shade and the attraction of other cocoa damaging viruses or insects. Hence, a final option would be to use **insecticides, which increases the risk of soil degradation.** [11)]

Sources: 1) Reuters (2018) 2) KIT (2018) 3) FAPAA (2018) 4) Bloomberg (2019) 5) WCF (2020) 6) CABI (2016) 7) Domfeh et al. (2016) 8) Guiraud et al. (2018) 9) Reay (2019) 10) Cargill SDM (2016) 11) Andres et al. (2016) 12) Kouakou et al. (2012); 13) Cargill, 16/10/2020; 14.) Nitidae (2020) Cocoa Diversified Assessment

Value chain

Limited access to inputs and finance hinder smallholders to apply good agricultural practices, perform diversification, and close the gap to a living income



Inputs	Cultivation	Aggregation	Processing

1. Limited availability and affordability of fertilizer and agrochemicals hinder smallholders to use these inputs.
2. Labor availability and affordability is a challenge because of the availability of more lucrative jobs.
3. Farmers use informal finance to buy inputs. Due to a lack of collateral, farmers are not able to access formal finance.
4. Ivorian cocoa farmers typically sell their unprocessed cocoa beans to local buyers (65%) or farmer cooperatives (35%).
5. The local buyers and farmer cooperatives sell to larger buyers, processors and exporters, who sell to international traders.
6. The Ivorian government incentivises the building of country grinders by international traders.
7. Private sector multinationals such as Cargill also provide marketing support and training to local buyers and cooperatives to improve efficiency and reduce marketing costs, while strengthening their supply chain.
8. The CCC sets a season fixed minimum farm-gate price.
9. A limited number of international traders lower the bargaining power of exporters, larger buyers, and local grinders.
10. Value is significantly unevenly distributed across the value chain: [3)]

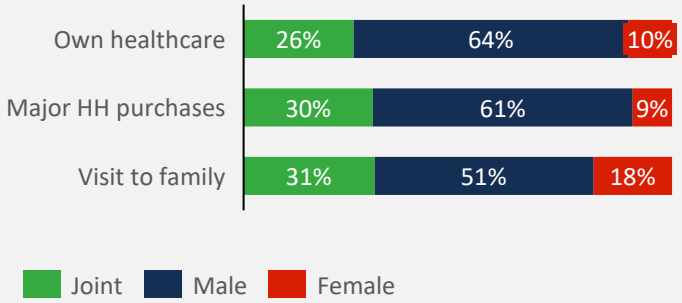
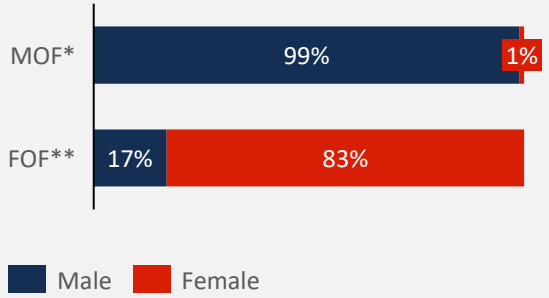
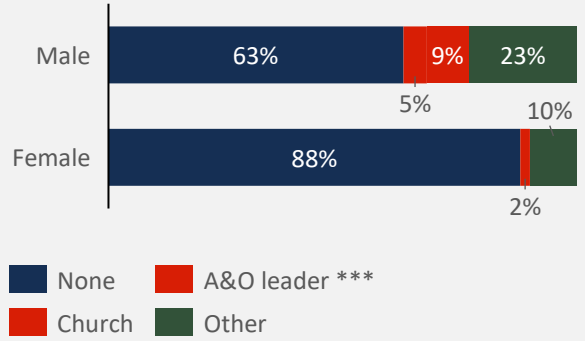
	Farmer	Traders	Manufacturing*	Taxes	Retailer
% share	7%	2%	43%	4%	44%

Sources: 1) KIT (2018); 2) Cargill (2016): SDM Analysis; 3) The World Bank (2019)

** Manufacturing includes grinding and transportation.*

Gender

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

Gender Dynamics:			
Category	**Decision making**	**Decision making on Productive activities**	**Women in Leadership**
Score			
Data	**Women's involvement in decisions** [2)]  	**Decision making on cocoa issues** [1)]  	**Fulfilment of leadership positions** [1)] 

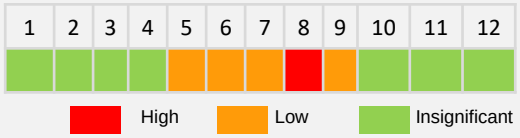
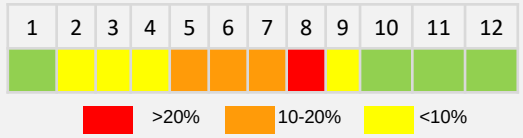
Category	Description of involvement	Detailed description of risk	Expected Impact
Involvement in household Activity	**Activities undertaken:** • The majority of the cocoa farm households in Ivory Coast has a male as head of the household. [1)] • In Ivory Coast significantly less female than male in the cocoa industry are able to read French or English. [1)]	• Disproportionate load of unpaid care work • Limited time to engage in productive / economic activities and in training on GAP (time poverty)	• Women's exclusion in effective participation in agricultural value chains • Unsustainable agricultural value chains
Involvement in Farm Activity	**Activities undertaken:** • Woman are involved with land preparation (19%), planting (31%), pod breaking (50%), and drying (18%). [1)]	• Uneven agricultural value distribution where women focus on poorly remunerated activities i.e. land preparation, pod breaking, and drying.[3)]	• Role of women invisible in agricultural value chains • Unequal distribution of value along the agricultural value chain

Sources: 1) KIT (2018); 2) DHS (2011-2012); 3) Farmer Field Book – Cargill (2020)

*Male-operated farms **Female-operated farms
*** Association and Opinion leader

Food Security

Cocoa farming households face food insecurity in the period before the main harvesting period

Farmer's overall Food Security status			
Category	**Cash-flow (Stability & Access)**	**Food Security (Access & Availability)**	**Assets (Stability)**
Score	**Medium**	**Medium**	**High**
Data	**CASH FLOW** [1)] Proportion of farmers that are cash-strapped during this month of the year. Farmers are most cash-strapped in Aug/Sept  	**FOOD SECURITY** [4)] Percent of farmers that expressed that they face food shortages during this month of the year. Farmers are most food insecure in Aug (just before harvesting starts)  	• **Ownership:** Owns land • **All land owned:** 7.96 ha [5)] • **Cocoa farm size:** 4.17 ha (~52% of total land) [5)] • **Other crops:** 1.19 ha (~15% of total land) dedicated to other crops. 77% percent of cocoa HH engage in sale of other crops [5)] • **Animals:** Insignificant source of revenue [5)]
Category	**Income (Access & Availability)**	**Market (Availability)**	**Health & Sanitation (Utilization)**
Score	**Low**	**Medium**	**Low**
Data	• **Cocoa sold:** Most of it is sold • **Crop loss:** 31% and 45% farmers face losses because of cocoa diseases and cocoa pests, respectively • **Farmgate price:** US$1.82/Kg (2020/2021 season) • **Price volatility:** Very high. Speculative trading and structural oversupply seen as the key reasons. • **Consumer price index**: -1.1 % (deflation) • **Income from cocoa:** 74% of annual HH income • **Income from other crops:** 6% of annual HH income • **Average income non-agricultural activities:** Insignificant [3)] • **World bank's poverty line:** 3,713 USD/HH/year [3)] • **Household size:** 8 people [3)]	• **Per capita food supply variability:** 36 kcal/cap/day^2 • **Global production**: Global production reached 4.8 M tons in 2019-20. Ivory Coast is global leader in production of cocoa, driving 45% of global production. • **Export vs Import:** Cocoa is the biggest export product of Ivory Coast (40% of national export revenue). Almost all the cocoa production is exported. • **Local market:** Insignificant	• **District level nutrition status:** The number of undernourished people in Ivory Coast has grown from 3.5 million (2000-2002) to 5 million (2017-2019). **National average dietary energy supply adequacy:** 2747 kcal/capita/day • **Access to clean water:** In Ivory Coast, 35% of individuals living in rural settlements do not have access to clean drinking water. Disproportionately affecting woman, who are responsible to bring water to their home.[6)] • **Access to sanitation:** 32.1% of the population has access to at least basic sanitation services.[7)]

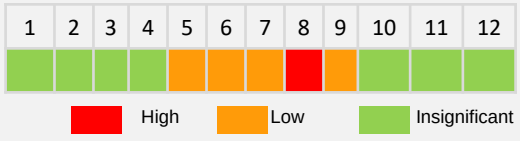
Sources: 1) World Bank (2017) 2) FAOSTAT database 3) Fairtrade (2018) 4) Authors' interpretation 5) KIT (2018); 6) Borgen Project (2020); 7) The World Bank (2017)

Climate Resilience

Increase of temperature and frequency of climate extremes shift favorable cocoa cultivations areas from east to west Ivory Coast

Farmer sensitivity and exposure to	Exposure	Sensitivity	Detailed description of risk	Expected impact
Changing temperatures	**High**	**High**	• The temperature is expected to increase with 1.6 – 2.9 C by 2050. [2) 3)]	• Increased crop/livestock losses from drought, floods, pests and disease, and coastal erosion and inundation. [3)]
Changing rainfall patterns and soil conditions	**High**	**High**	• In Ivory Coast, the south has two rain season (April - June and September - October). With no change in total rain fall and decrease in rain days, the number of extreme rainy days is expected to increase. [2) 3)] • Rise of sea water of 17-45 cm by 2050. [3)]	• Reduced water quality and availability, intensifying flood events, coastal inundation, and salinization will shorten growing season and affect yield. [3)] • Ivorian government foresees that most of affected farmers should adopt to climate change, and that farmers located in the middle if Ivory Coast will stop cultivating cocoa. [6)]
Frequent climate extremes	**Medium**	**High**	• Increased frequency and intensity of heavy rainfall. [3)]	• Drought and floods will affect yield.

Farmer adaptive capacity

Category	Income & cash-flow	Assets	Access to services
Adaptive capacity	**Medium**	**Good**	**Medium**
Data	**CASH FLOW** [4)] Proportion of farmers that are cash-strapped during this month of the year. Farmers are most cash-strapped in Aug/Sept  	• **Ownership:** Owns land • **All land owned:** 7.96 ha [1)] • **Cocoa farm size:** 4.17 ha (~52% of total land) [1)] • **Other crops:** 1.19 ha (~15% of total land) dedicated to other crops. 77% percent of cocoa HH engage in sale of other crops [1)] • **Animals:** Insignificant source of revenue [1)]	• **Technical:** In Ivory Coat, only 10% of farmers are being paid digitally for their cocoa through a formal procurement system; rest are paid with cash-on-delivery. [5)]

Sources: 1) KIT (2018); 2) USAID (2018); 3) AFDB (2018) 4) World Bank (2017) 5) World Cocoa Foundation (2020) 6) The World Bank (2019)

STRATEGY

Understanding the SDM's strategy and business model

Strategy

Cargill is well positioned to unlock high sustainability potential in cocoa cultivation by using their experience and network for diversification, access to finance, and service provision

Goals & Aspirations

Aspirations

- *Secured supply* – Cargill aspires to secure the supply of cocoa to its factories, and maintain the current and future need for its local factory capacity.
- *Sustainable supply* – Cargill aspires to increase the sustainability of its sourced cocoa to align with its corporate values and customer requirements.
- *Efficient supply* – Cargill aspires to ensure an efficient supply with the use of its existing infrastructure of factories and coops and smallholders Cargill sources from.

Goals

- [redacted]MT cocoa sourced annually in Ivory Coast by 2024 (2020: [redacted]MT).
- 1 mln. farmers benefited from the Cargill Cocoa Promise on livelihood increase and community wellbeing by 2030;
- Zero deforestation in Cargill's direct and indirect cocoa supply chain by 2030;

Where to Play

To secure cocoa supply,

- Cargill maintains the high engagement of farmer through cooperatives to sustain and increase cocoa yields within regulatory boundaries.
- Cargill maintains the long-term relationships with farmer cooperatives.
- Cargill operates within set market boundaries by stakeholders (e.g., CCC).

To secure sustainable supply,

- Cargill supports smallholders work towards a living income.
- Cargill supports smallholders to prevent harm to the environment (e.g., deforestation) or to re-enforcing the environment.

To secure efficient supply,

- Cargill maintains high farmer loyalty to supply cocoa through coops.
- Cargill builds capacity of the coops it sources from.

How to Win

Secure supply

- Support farmers to sustain cocoa yields (e.g., mitigating swollen shoot).
- Ensure a strong business case for coops to work with Cargill by providing value (e.g., coaching and premiums).
- Align with strict regulated cocoa market.

Sustainable supply

- Support crop selected for diversified production and create market access to diversify farmer income.
- Promote the performance of GAP.

Efficient supply:

- Encourage coops to increase farmer loyalty (organic increase).
- Build capacity of coops to improve their professionalism on e.g., financial governance and develop their track record.
- Investment in digitalization to increase traceability, investability, and sustainability of cocoa cultivation.

Capabilities Required

Critical capacities

- **Knowledge and expertise** on smallholder service provision, especially to sustain productivity and mitigate risks (e.g., swollen shoot disease);
- **Network and collaboration** with government (e.g., CCC) and market stakeholders
- **Network, pilot experience, and vision** *on diversification* and continuous development.
- **Knowledge and expertise** on coop capacity building, especially to increase professionalism and access to finance, and development of training (e.g., graduation)
- **Ability to incentivize coop behavior** to increase both coop and farmer loyalty.
- **Ability to provide digital and banking solutions** to farmers to increase traceability and sustainability.

Sources: 1) Cargill – Cote d'Ivoire (2020); 2) Cargill – Invests (2019); 3) Reuters (2020); 4) Cargill, 08/10/2020

Scope and scale

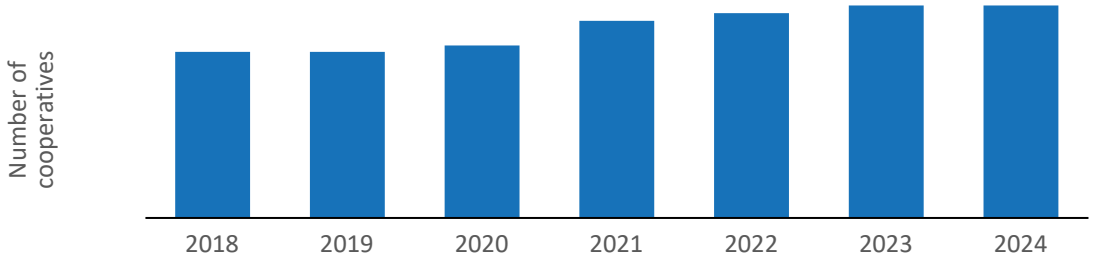
While piloting different diversification studies with several cooperatives across Ivory Coast, Cargill intends to organically grow the cooperative and farmer-base it sources from

Cooperative and Farmer-base

- Per 2020, Cargill sources from [redacted] smallholders through [redacted] cooperatives (~[redacted] farmers/coop), [redacted].
- Cargill intends to grow it's farmer-base with sourcing from [redacted] smallholders through [redacted] cooperatives in 2024 (~[redacted] farmers/coop)

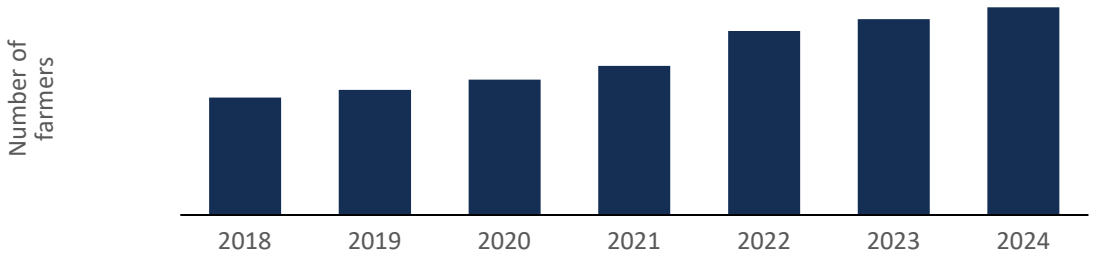
Scale of cooperatives

Number of cooperatives per year



Scale of farmers

Number of farmers per year

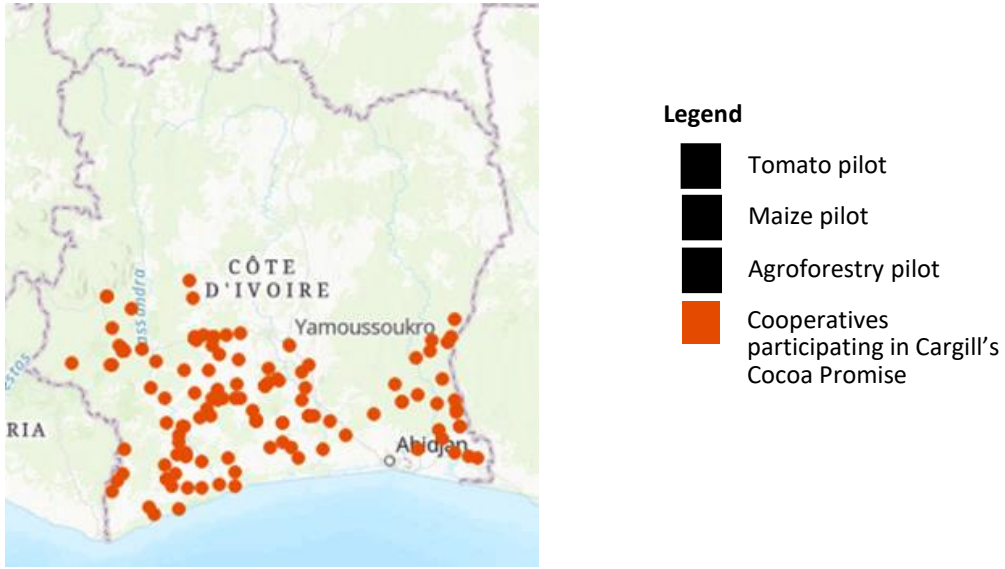


Diversification

- Cargill dedicates effort in increasing knowledge and insights on diversification with e.g., tomato, maize, poultry, and agroforestry.
- Per 2020, diversification projects for tomato and maize have been conducted, and pilots for poultry and agroforestry are about to start.

Location of current diversification projects

Location of cooperatives that participate(d) in diversification projects



Business model (1/2)

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

Core-business

Quality control & Processing

- The quality of the cocoa-beans is checked visually by the cooperative and with the use of technical instruments at Cargill's grinding factories.
- If the beans contain > 6% mold, cooperatives resupply the beans to Cargill after drying and mixing the affected beans with non-affected beans till a < 6% mold.

Sourcing

- Cargill sources through [redacted] cooperatives (2024: [redacted]) from [redacted] factories.
- Processed and raw cocoa is sold to manufactures in the food industry.
- The transport from the farmer to Cargill, through the cooperative, is arranged by the cooperative.

Supporting activities

Finance

Doni Doni – Truck leasing

- A selection of coops has access to trucks from CFAO with a 10% initial payment and 3-year leasing financed by Société Ivoirienne de Banque (SIB), at < 10% rather than 18% lending rates
- Cargill and IFC take on risk sharing guarantees, with which they reduce the interest-rate.

Mandat ([redacted]) – Working capital

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

Revolving ([redacted]) – Trade finance

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

Digitalization

FarmForce

- Cargill's mobile application, used for GPS polygon farm mapping, coops management system (CMS) and traceability, to reach > 1,200 coop leaders;
- From April 1st 2020, cocoa farmers in Ivory Coast receive information from FarmForce on COVID-19 measures from the Ivorian government.

CocoaWise™

- CocoaWise™ pulls information from a centralized data platform, CocoaWise™ 360, which is fed from a suite of Cargill's digital tools that are designed to increase transparency and traceability while enhancing cocoa farming practices and community well-being.

Bar-code / Bank-accounts

- Cargill invests to enable 88,000 farmers to use bar-code on cocoa bags to electronically trace cocoa back to Cargill's factory.
- In two years, Cargill wants to pay its farmers only digitally, by providing bank-accounts to ~30,000 farmers.

Margin

Business model (2/2)

Farm services

Training

- GAP training and certification of 110,000+ farmers through 400+ Farmer Field Schools (FFSs).
- Coaching of farmers with 2-3 visits annually to develop a Farm Development Plan (FDP).
- On-the-job training of farmers (in pilots) with coop-level diversification projects of e.g., tomato, poultry, maize, and agroforestry.
- Development of training portfolio to align with certification requirements.

Crop protection (Yiri+)

- Smallholders collectively purchase crop protection packages through Cargill by combined purchase orders administered by coops.
- Cargill coordinates pre-payment to input provider on behalf of coops, who repay through cocoa supply.
- Cargill and MFI share risk with input provider by giving a guarantee to repay a small % of lost income when coops default.

Certification

- Cargill finances training and certification of farmers, who are inspected by coops and independent assessors of RA/UTZ.
- Based on pre-determined sourcing quota, estimated on coops' farmer-base, Cargill pays premium to coops and farmers for sourced certified cocoa-volume.
- 130,000+ farmers are RA/UTZ certified (~80% of cooperatives).
- [redacted] Coops are Fairtrade certified

Fertilizer

- High-quality fertilizer made available to smallholders through coops, who can either pre order (Oct – Feb) or order (Feb onwards) from input provider.
- Cargill coordinates payment and purchase order to input provider.

Planting Materials

- Cocoa nurseries are established by Cargill and operated by ANADER.
- Cocoa pods are provided free of charge by CCC, and distributed, transported, and sold by coops to smallholders for 100 CFA per seedling after 6-months.

Coop Academy

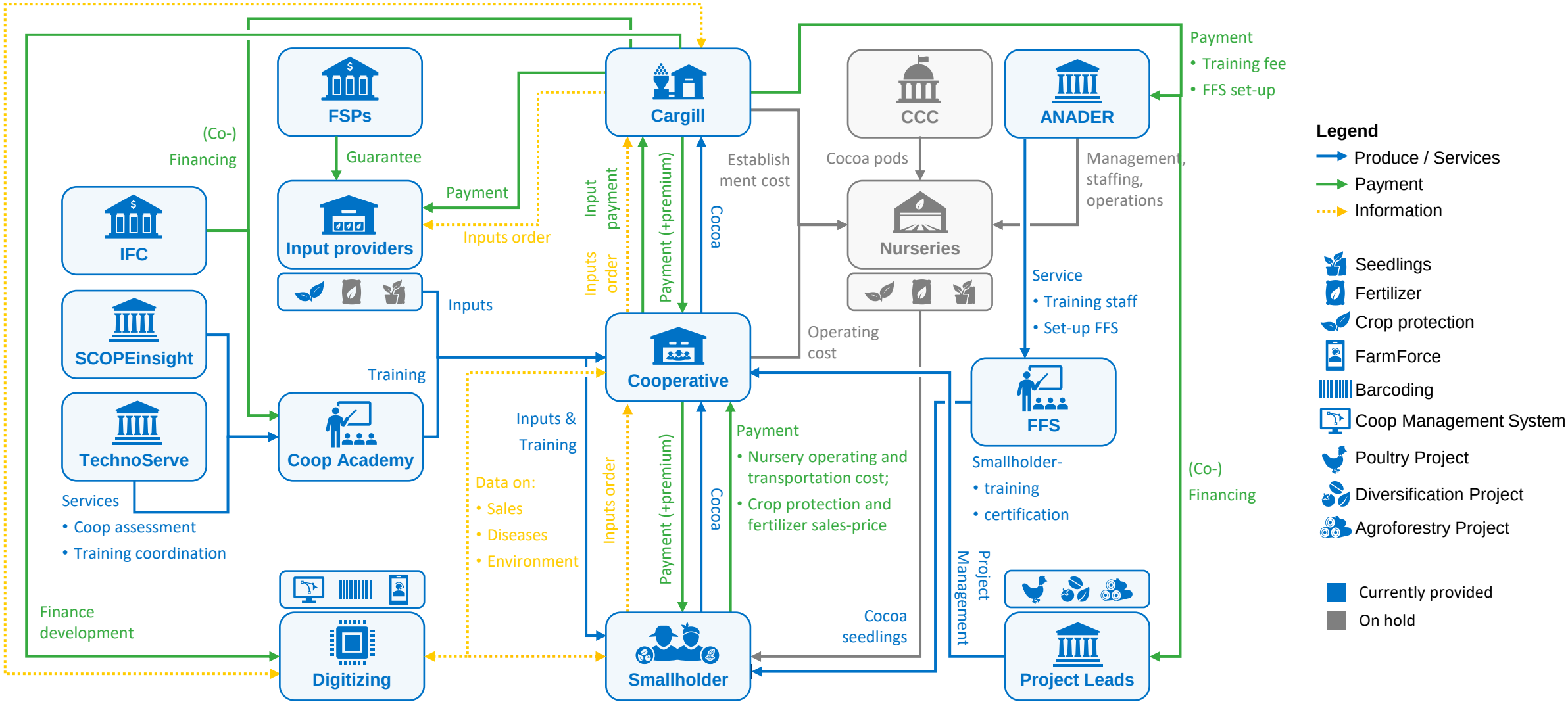
- 140 coops with whom Cargill operates receive training on management capacity, access to finance, and gender inclusion.
- Training is financed by Cargill and IFC

Legend

- Currently provided
- On hold
- Led by Cargill
- Led by Cooperative
- Crop: Cocoa
- Crop: Diversified
- Crop: Agroforestry
- Received by farmer
- Received by cooperative

Margin

Service provision infrastructure



SWOT-Analysis

Challenges driven by CCC regulations and CSSVD can be converted into opportunities to improve farmer income diversification and loyalty

	Helpful	Harmful
Internal	**Strength** • [redacted] • [redacted] • [redacted] • [redacted]	**Weakness** • [redacted] • [redacted] • [redacted] • [redacted]
External	**Opportunities** • [redacted] • [redacted] • [redacted]	**Threat** • [redacted] • [redacted] • [redacted]

Partnerships (1/2)

Actor	Organizations	Function (within this SDM)	Revenue model (within this SDM)	Incentive to participate (within this SDM)
Operator	• Cargill Cocoa and Chocolate	• Value chain investor; • Sources and processes cocoa beans and exports cocoa liquor, butter and powder products.	• Margin on cocoa sales	• Increase and secure sustainable cocoa supply, by achieving sustainability goals, transform the sector, accelerate progress, and contribute to alleviation of poverty in rural communities.
Project Leads	• IDH • TechnoServe • International Cocoa Initiative • CARE International,	• Accelerate and scale up sustainable trade by building impact-oriented coalitions; • Develop business solutions to poverty by linking people to information, capital and markets; • Promotes child protection and woman empowerment in cocoa producing Ivory Coast	• None • Consulting fee	• Increase experience on business with smallholders and cooperatives. • Bring into practice the results of research
Financial Service Providers	• International Finance Corporation (IFC) • Société Ivoirienne de Banque (SIB)	• Blends investment with advice and resource mobilization to help the private sector advance development.	• Payment of interest by cooperatives and Cargill, and farmer in long-term.	• Attract new agri-customers • Increase experience on business with smallholders and cooperatives. • Capture savings made by smallholder farmers, and increase farmers access to banks services and products
ANADER	N/a	• Formerly governmental organization • Contributes to improving rural livelihoods through professionalization of farmers and farmer organizations in Côte d'Ivoire	• Provision by SDM operator.	• Increase access to quality cocoa seedlings

Partnerships (2/2)

Actor	Organizations	Function (within this SDM)	Revenue model (within this SDM)	Incentive to participate (within this SDM)
Input providers	• Syngenta • Louis Dreyfus Commodities • Callivoire • Bayer • CIDH / PROSODEC	• Manufacture and sell agro inputs and equipment in order to improve farmer productivity	• Margin on product sales	• Increased sales volumes • Increase experience on business with smallholders and cooperatives.
Cooperatives	N/a	• Farmer cooperative • Supplies members with services and agro inputs to improve farmer productivity and livelihoods	• Margin on cocoa, input and diversified crop sales.	• Increase and secure sustainable cocoa supply. • Receive training and build management capacity, increase access to finance and woman empowerment.
Government	Conseil du Café-Cocoa	• Governmental organization • Contributes to regulation, stabilization and development of the coffee and cocoa sector in Côte d'Ivoire	• Tax on cocoa sales	• Catalyzes the development of the cocoa value chain in Ivory Coast • Promote a diversified economic model for new generation farmers
Research Institutes	• SCOPEinsights • PUR Project • Nitidae	• Research institute to assess the possibility of implementing community-based reforestation and agroforestry, diversification and coop-capacity building initiatives.	• None • Consulting fee	• Increase experience on business with smallholders and cooperatives. • Bring into practice the results of research

SDM PERFORMANCE

Assessing the SDM's financial performance and opportunities for improvement

Assessment of potential income diversification activities

Based on a multi-angled, high-level assessment, five activities are considered the most promising income generating activities for members of the example cooperative used for this study

Option	KOLA	Sheep	Palm trees	Cashew	Horticulture	Silviculture	Poultry	Cassava	Maize/Rice
Land [1] Need for supplementary land for diversification option.	< 0.5 Ha	0.5 – 2 Ha	> 1 Ha	> 1 Ha	0.5 – 2 Ha	< 0.5 Ha	< 0.5 Ha	0.5 – 2 Ha	0.5 – 2 Ha
Capital [1] Need for monetary investment for diversification option.	< 500,000 CFA/Ha	500,000 – 1,000,000 CFA/Ha	500,000 – 1,000,000 CFA/Ha	500,000 – 1,000,000 CFA/Ha	> 1,000,000 CFA/Ha	< 500,000 CFA/Ha	> 1,000,000 CFA/Ha	< 500,000 CFA/Ha	< 500,000 CFA/Ha
Work [1] Need for supplementary work for diversification option.	< Weekly	Weekly	Weekly	< Weekly	Daily	< Weekly	Weekly	Weekly	Weekly
Income potential [1] Estimate on income potential of diversification option.	Medium/Low	Medium	High	High	High	Medium	Medium	Medium/Low	Medium/High
Macro market potential [1] Market characteristics (e.g., demand, supply, infrastructure, etc.)	Competition with informal value chain.	Market shortage on supply.	High potential if close by industrial facility	High potential if climatic suitability of the growing area	Off-season opportunities	Long-term shortage of wood. But lack of involvement of sawmills	Local demand, risk of competition with big breeders on national market	Market saturation	Risk of competition with northern areas, need breeders or partnerships
Assessment of income generating potential [2]	Medium	Medium	Medium	**High**	**High**	**High**	**High**	Medium	**High**

Example for cooperative in Central Ivory Coast

Sources: 1) Nitidae (2020) – Cocoa Diversification Assessment; 2) Assessment of income generating potential is based on Nitidae report and conversations with Cargill SDM team

Strategic diversification for farmers and cooperative

The five high-potential income diversification activities were translated into strategic diversification approaches for farmers and the example cooperative

Option	Cashew	Horticulture	Silviculture	Poultry	Maize/Rice
Suitability for farmers	Too little local farmer experience and lack of seedlings	Tomatoes (non-irrigated)	Agroforestry: - Lining cocoa plantations - Intercropping with cocoa trees	Too much investment required by farmers	Maize (non-irrigated)
Suitability for cooperative	Too little local farmer experience and lack of seedlings	Tomatoes (potentially irrigated) as additional revenue stream and training opportunity for farmers	Not considered as no cocoa cultivation takes place	Additional revenue stream	Maize (potentially irrigated) as additional revenue stream and training opportunity for farmers

Example for cooperative in Central Ivory Coast

Strategic diversification for farmers

	Agroforestry	Crop rotation	Intercropping
Young trees	Yes	Tomato and maize on all non-cocoa land	No intercropping
Swollen shoot	Yes	Tomato and maize on all non-cocoa land and in years 1-2 after uprooting of cocoa plantation	Maize with cocoa seedlings in years 3-6
Aged trees	Yes	Tomato and maize on all non-cocoa land	Maize with cocoa seedlings in years 1-4

Strategic diversification for cooperative

	Poultry breeding	Crop cultivation	Crop trading
Scenario 1	Yes	Non-irrigated tomato and maize for farmer training	Cocoa
Scenario 2	Yes	Irrigated tomato and maize for farmer training	Cocoa, tomato and maize

Gap analysis diversification services

Strategic diversification for farmers and cooperatives will only be successful if Cargill ensures that five critical services are in place

	Gap to fill	Service beneficiary	Suggested owner of service	Additional considerations
Market Access	• Infrastructural and contractual connection from farmer through aggregator to off-taker to be established	• Farmers	• **Cargill** to ensure that **non-cocoa off-takers** establish market access where it doesn't exist or function	• We explore three models, with differing levels of commitment and investment required by Cargill
Financial Services	• Pre-financing of produce is required so that farmers can be paid upon delivery • Inputs on credit	• Farmers (potentially through cooperatives)	• **Cargill** to mobilize **non-cocoa off-takers** to ensure access to adequate financing for farmers	• Cargills efforts towards adequate financing for long-term cocoa production can potentially serve as example
Training	• Training materials for applicable diversification activities to be incorporated into existing curricula	• Farmers and cooperatives	• **Cargill** to commission **Technoserve**	• The likelihood of farmers attending non-cocoa trainings will likely decrease if trainings are not integrated
Inputs	• High-quality inputs for applicable diversification activities (crops and livestock) to be accessible	• Farmers and cooperatives	• **Cargill** to support **coops** in establishing connection with any additional **input providers** as required	• For required inputs that can be sourced with existing input suppliers, no new connections are needed
Material & Equipment	• Material and equipment for applicable diversification activities (crops and livestock) to be accessible	• Farmers and cooperatives	• **Coops** to establishing connection with local **material and equipment providers**	• Coops should connect to respective off-taker if certain materials or equipment are not locally accessible

Market access for non-cocoa produce

There are different degrees to which Cargill can support farmers in selling their non-cocoa produce, with corresponding costs and benefits

	1 **AT ARM'S LENGTH**	*Recommended* 2 **VALUE CHAIN DEVELOPMENT**	3 **BUY/SELL MODEL**
	Cargill introduces trustworthy off-takers of non-cocoa produce to farmers, non-cocoa produce is not traded through cocoa cooperatives	*Cargill partners with trustworthy off-takers of non-cocoa produce and others to develop a new value chain and enable cooperatives to trade produce*	*Cargill buys non-cocoa produce through cocoa cooperative and sells to off-taker at a small margin*
+	• Limited financial and other resources required	• Delivers the most sustainable outcome as these value chains will ultimately operate independently • Other off-takers secure trade finance for non-cocoa produce and inputs	• Cargill has full control and can be flexible in how to set up the service in detail. A small margin will be earned on processed non-cocoa
−	• Limited control and therefore potentially limited benefit: if off-takers decide to not make the required investment, diversification into that activity fails	• More complex and time-consuming to set-up	• Cargill deviates from its core business of trading cocoa • Cargill needs to secure trade finance for cooperative to pre-finance non-cocoa produce and inputs for farmers

Farmer and cooperative financing

To decrease the likelihood of farmers having to transition away from cocoa in the long term, Cargill can choose to invest in existing or new initiatives to enhance farmer access to adequate financing

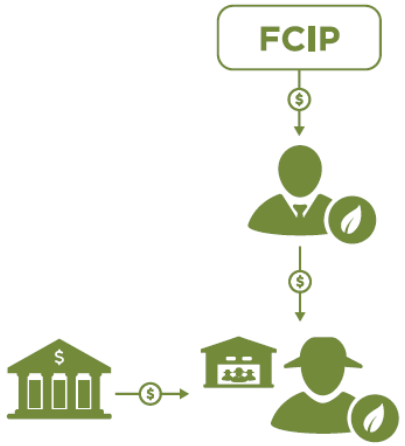
Existing initiative

As an existing member of the Farm & Cooperative Investment Program, Cargill can look for a lender who is willing to provide long-term financing to farmers at affordable rates.

FCIP
Farm & Cooperative Investment Program

Cargill can leverage the existing efforts towards launching the improved FCIP 2 in which more focus will lie on finding ways to make farmer financing more affordable and long-term.

The success of FCIP in the area of long-term, affordable financing of farmers has not yet been proven.

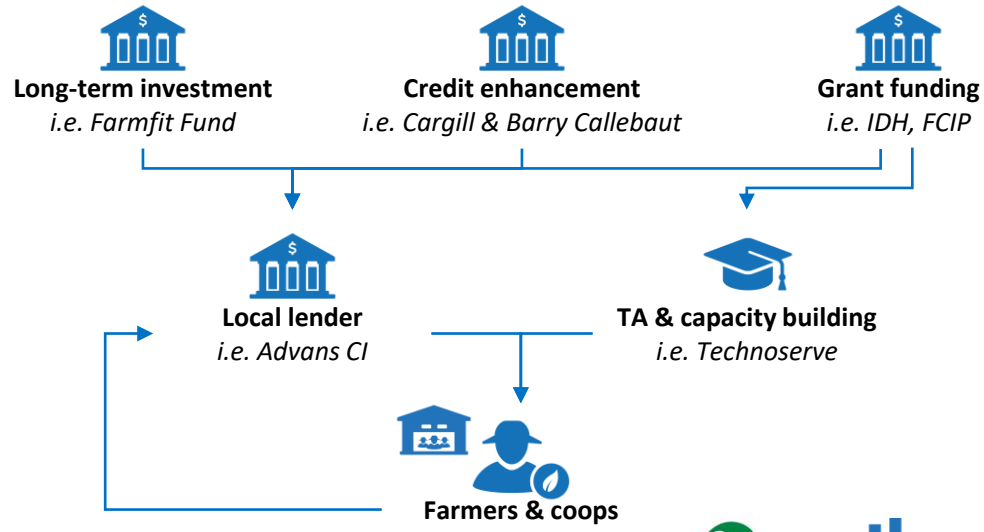


New initiative

Cargill can also opt to partner with other cocoa traders or with clients, to set up a new farmer financing structure as a consortium. This will firstly require a local investor who is willing to provide loans to farmers, and secondly an implementation partner for local capacity building and technical assistance.

To ensure the affordability and long-term nature of the financing, the consortium will need to find long-term investors, credit enhancers who can de-risk the long-term investments and a grant-funding party to finance capacity building and technical assistance.

A blueprint[1] for such a structure could look as follows (including examples of potential partners):



1) Inspired by the Coffee Farmer Resilience Initiative. Partners mentioned are exclusively for illustration purposes and roles could be different, no commitment from these partners has been secured.

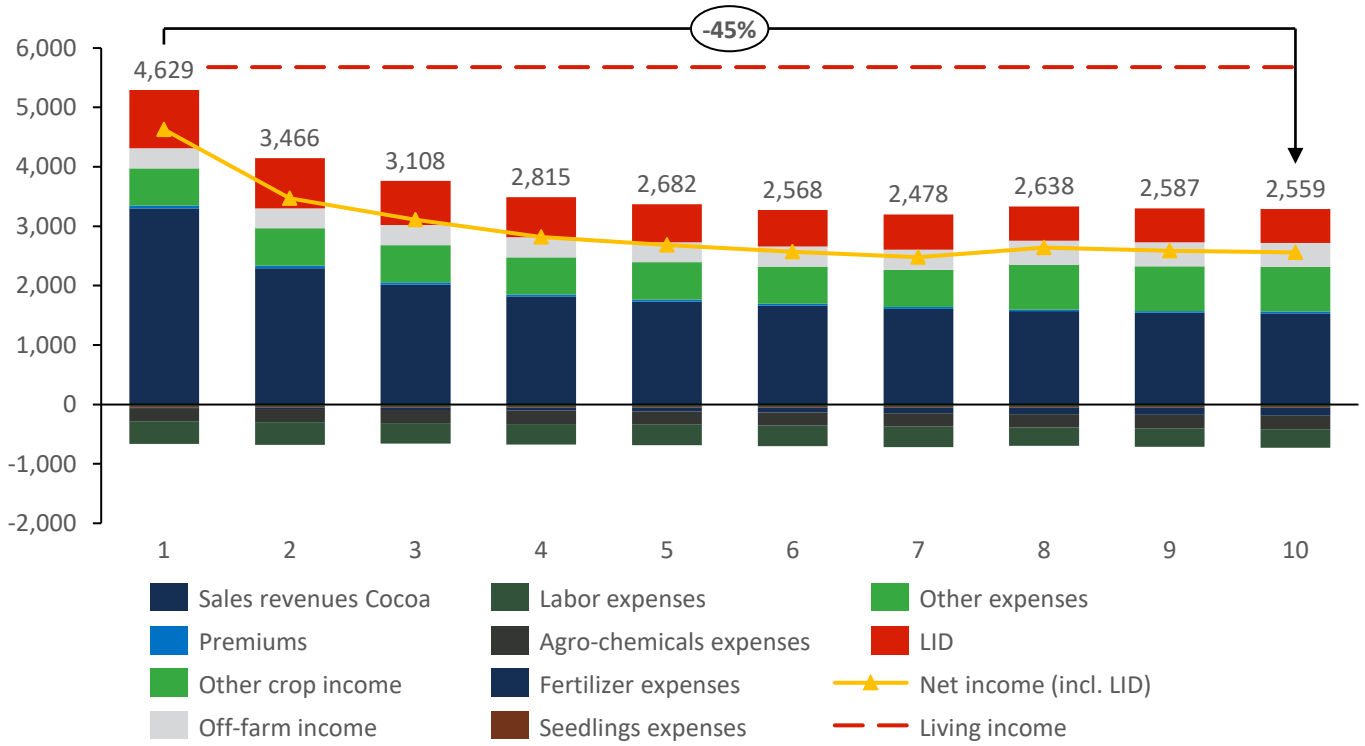
FARMER PERFOMANCE

Assessing farmer impact and opportunities for improvement

Farmer income over time – affected by swollen shoot

A farmer affected by swollen shoot who does not have the means to uproot his plantation in order to eradicate the disease, will see net income almost halved over the course of ten years

Net income (incl. LID) of farmer affected by swollen shoot, not renovating
Over time, in USD/year



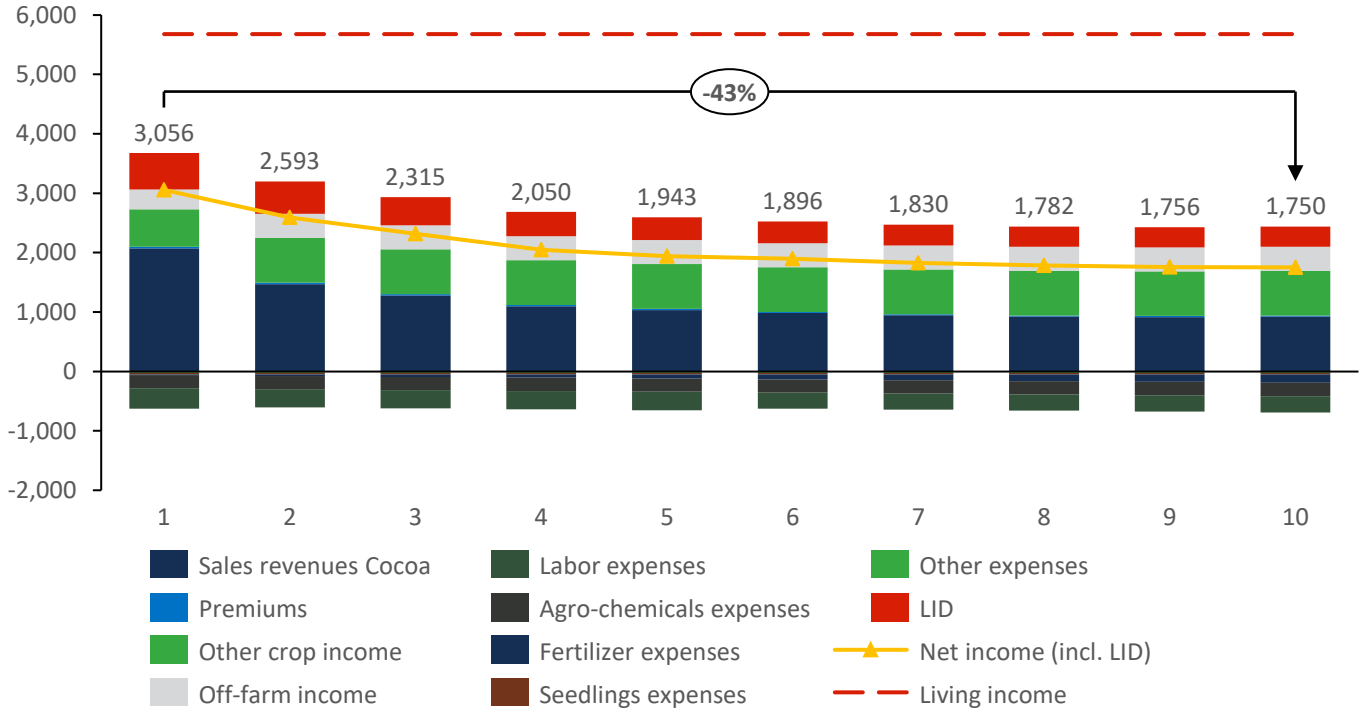
Profitability over time

- This bar-chart represents the modelled net income development of a farmer whose plantation is partially affected by swollen shoot, and who does not have the means to uproot and eventually replace his plantation in order to effectively eradicate the disease
- Overall production is the driver of the decline in net income: productivity is negatively impacted by the occurrence of swollen shoot on part of their plantation on the one hand, and by the ageing of trees on the other hand
- As a result of lower overall production of these farmers, the LID that they would be entitled to also decreases, enhancing the impact on net income
- Assuming that the farmer receives the LID, his year one income would be 82% of the living income threshold, but rapidly declines to below half (45%) of that income by year 10

Farmer income over time – aged trees

A farmer with a plantation of aged trees who does not have the means to invest in the renovation of his plantation, will see net income decrease by 43% over the course of ten years

Net income (incl. LID) of farmer with aged trees, not renovating
Over time, in USD/year



Profitability over time

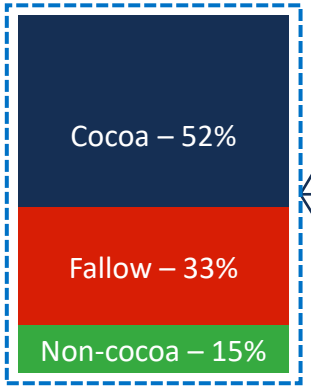
- This bar-chart represents the modelled net income development of a farmer whose plantation has an average age of 33 years, and who does not have the means to replace his ageing plantation over the course of five years in order to ultimately reverse the trend of declining productivity
- Overall production is the driver of the decline in net income: productivity is negatively impacted by the ageing of trees on the other hand
- As a result of lower overall production of these farmers, the LID that they would be entitled to also decreases, enhancing the impact on net income
- Assuming that the farmer receives the LID, his year one income would be 54% of living income, but that gap increases to 31% of living income in year 10

Strategic diversification – modeling crop calendars

Per farmer segment, the strategic diversification approach was translated into a yearly and monthly cultivation schedule for intercropping and crop rotation

Land use under strategic diversification:

Current land use:



	Cocoa	Fallow	Non-cocoa
Young trees	- Lining cocoa plantations with shade trees - Intercropping cocoa trees with shade trees		
Swollen shoot	- Lining cocoa plantations with shade trees - Intercropping cocoa trees with shade trees - **Crop rotation** of tomato and maize in years 1-2 after uprooting of cocoa plantation - **Intercropping** maize with cocoa seedlings in years 3-6: Year 1 2 3 4 5 6 7 8 9 10 Crops	**Crop rotation** of tomato and maize	
Aged trees	**Intercropping** maize with cocoa seedlings in years 1-4 Year 1 2 3 4 5 6 7 8 9 10 Crops		

Legend

- Tomato & maize
- Maize
- Tomato
- Cocoa

Intercropping calendar

Month	1	2	3	4	5	6	7	8	9	10	11	12
Maize												

Crop rotation calendar

Month	1	2	3	4	5	6	7	8	9	10	11	12
Tomato												
Maize												

Example for cooperative in Central Ivory Coast

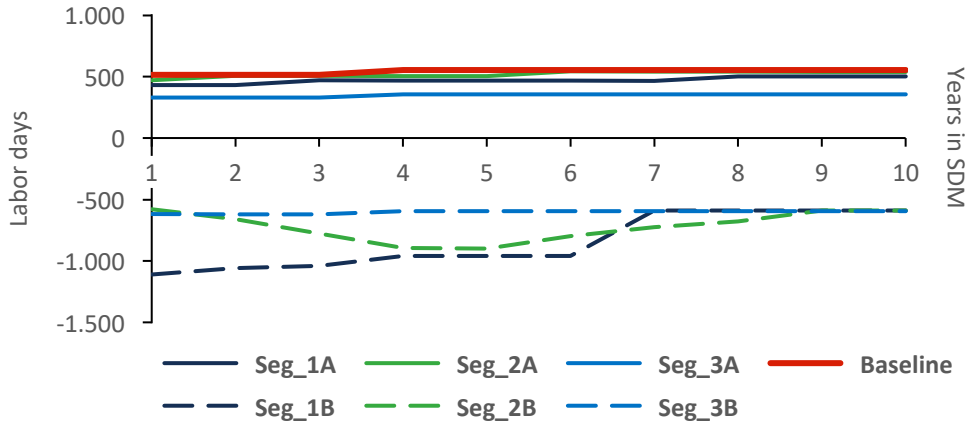
Strategic diversification – modeling labor requirements

Strategic diversification next to cocoa requires more labor than is available in the farmer household, leading to a need to hire external labor for strategic diversification

In our modelling we have assumed that household labor is primarly used for cocoa farming. Remaining household labor is then divided pro-rata over the strategic diversification activities. The cost for hired labor (represented by a negative value in the graph on the left-hand side below) is also divided pro-rata over the strategic diversification activities.

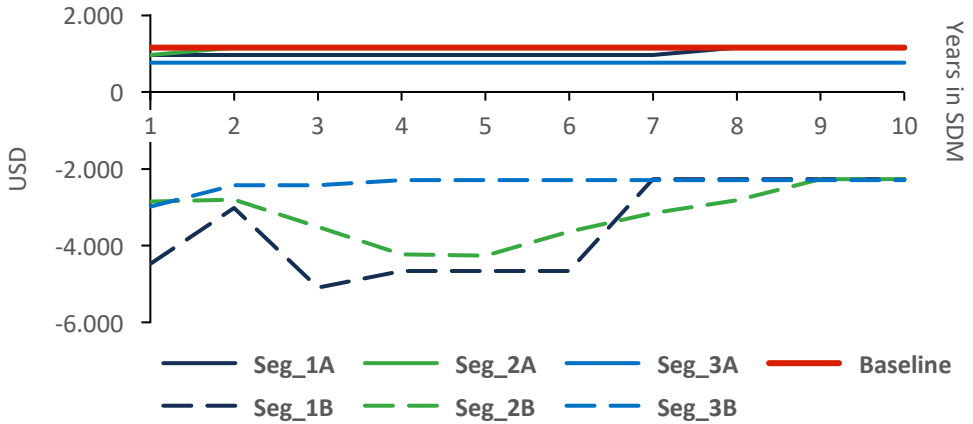
Annual remaining household labor days

Household labor days/year



Net income of non-cocoa activities

USD/year



Discussion

- The graph on the left indicates that current diversification activities require significantly less labor (solid lines) than the strategic diversification activities (dashed lines)
- The graph on the right demonstrates how the consequential cost of hiring external labor to supplement household labor, negatively impacts the net income from diversification: all farmer segments currently have a positive contribution to their cocoa income from diversification, but this becomes a negative contribution in the case of strategic diversification for the example strategic diversification approach designed for the cooperative in Central Ivory Coast

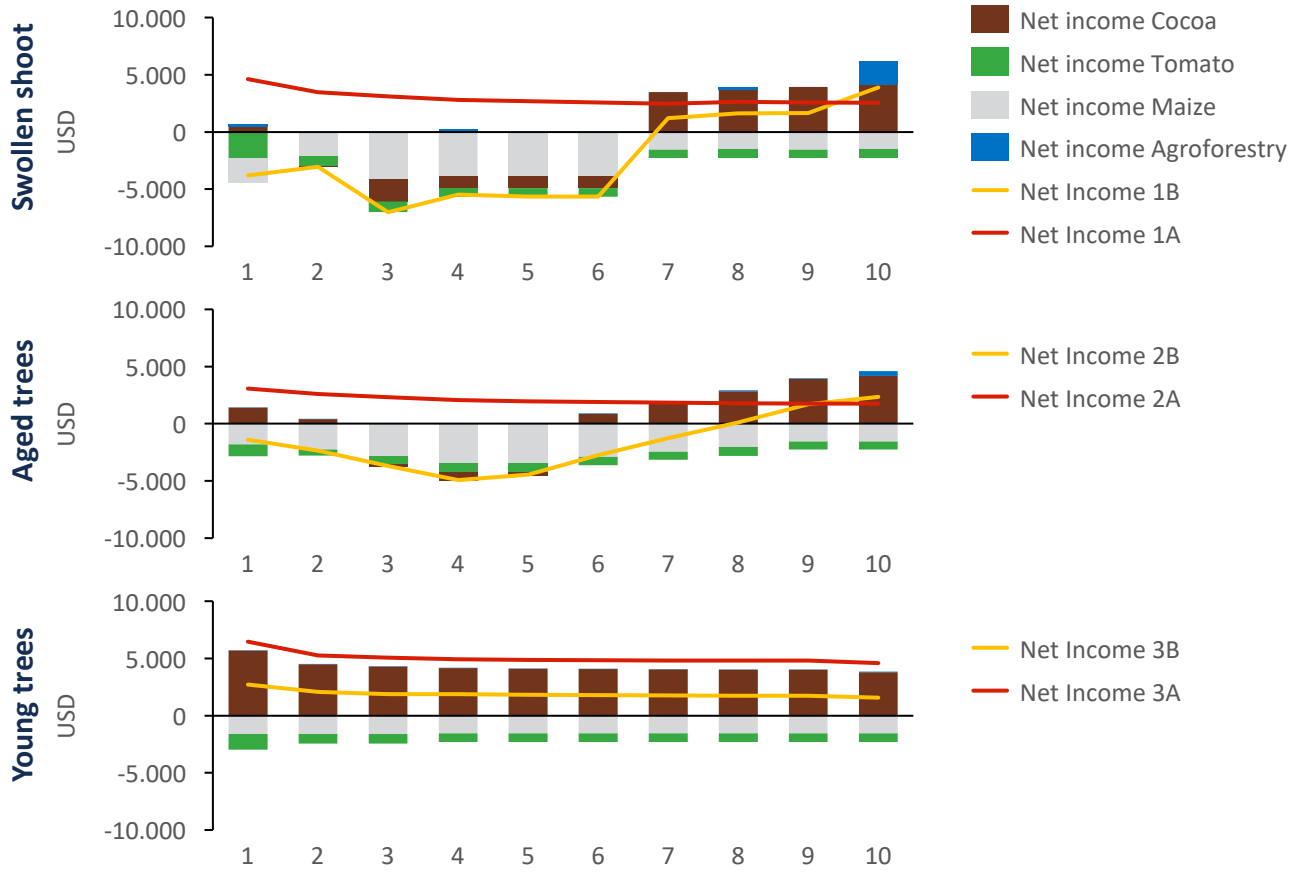
Example for cooperative in Central Ivory Coast

Strategic diversification – impact on total farmer income

The strategic diversification approach developed for members of the example cooperative in Central Ivory Coast is not expected to enhance farmer net income, but rather to significantly decrease it

Farmers can dampen income loss while replanting with diversified intercropping.

Projection of revenue and cost for primary segment compared with net income of contra segment.



1) Based on data received from Cargill, our model shows that maize is not profitable even if no external labor is required, due to high cost of fertilizer and low value of crop.

Discussion

- After modelling the crop calendars and labor requirements for strategic diversification into the cocoa farmer income statements, we see that the strategic diversification does not have the desired approach of enhancing farmer net income
- The graph for farmers with young trees demonstrates a negative impact on farmer net income of strategic diversification versus current diversification: in year 10 the farmer who diversifies strategically, has a 59% lower income than the farmer who continues to diversify according to current diversification practices
- When looking at the farmers affected by swollen shoot or those with aged trees, our models show that strategic diversification combined with renovation of cocoa plantations also delivers a lower net result: only in year 10 is the income higher than the projected income without renovation and strategic diversification
- To compensate for external labor cost, a high value crop should be considered, the value of maize versus the cost of cultivation seems to be too low[1]. Tomato does create additional value

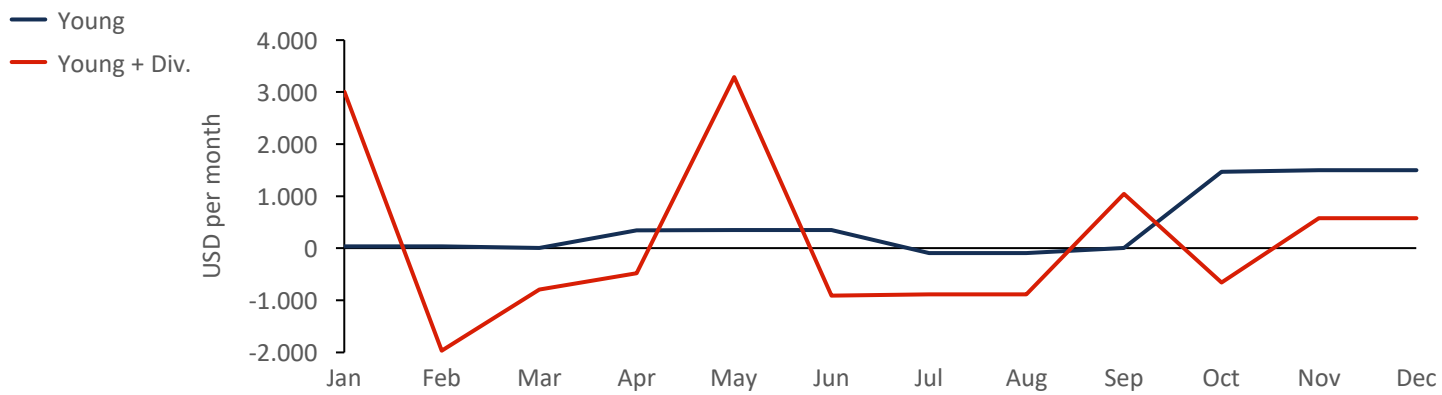
Example for cooperative in Central Ivory Coast

Farmer cash-flow

The cultivation of tomato and maize crop does not mitigate the cash shortage in times between the light and main cocoa harvest period

Comparing cash flows between farmer with young trees who does and does not diversify.

10-year average in USD/month



		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cacao	Land clearing	X	X	X									
	Land prep.			X	X								
	Planting cocoa				X	X	X						
	Herbicide/Insect.	X	X	X	X	X	X	X	X	X	X	X	X
	Fertilizer				X	X	X	X	X				
	Weeding			X	X	X	X	X	X	X	X		
	Pruning			X	X	X	X	X	X	X	X		
	Harvesting				X	X	X				X	X	X
MT	Cultivate / Harvest	Harv.	Cult.	Cult.	Cult.	Harv.					Cult	Cult	Cult
	Cultivate / Harvest						Cult.	Cult.	Cult.	Harv.			

Discussion

- Farmers who do not diversify have cash shortage in July – September, due to cultivation of cocoa (fertilizer, crop protection, and labor) but no income as it falls between the light (April – June) and main harvest periods (Oct – Dec).
- Farmers who diversify have a volatile cashflow due to cost and income peaks from diversified crops, in combination with cost from the cultivation of cocoa.
- Whereas the cash shortage from diversifying farmers in September is mitigated, due to the purchase of inputs for diversified crops, the shortage is replaced to October.

Note: these numbers potentially exclude some significant annual expenses, like school fees. They also do not account for unexpected off-farm expenses like medical costs, weddings, funerals etc. The assumptions were obtained from conversations with Cargill staff who are expected to have a good understanding of farmer cash-flows and literature where available.

Sensitivity analysis on farm business case

Implementing the Living Income Differential (LID) is not sufficient to close the gap to a living income, increasing the risk of deforestation and the importance of other income.

Variable	Young trees assumption	Required assumption to get to living income ($5,676) [1)]	Change required
Price [2) & 3)]	*1.13 $/kg (excl. LID)* *1.55 $/kg (incl. LID)*	*+ 0.65 $/kg (excl. LID)* *+ 0.23 $/kg (incl. LID)*	*58%* *15%*
Productivity	*0.90 kg/tree*	*+ 0.52 kg/tree (excl. LID)* *+ 0.14 kg/tree (incl. LID)*	65% 16%
Farm size	*3.50 Ha*	*+ 2.80 Ha (excl. LID)* *+ 0.69 Ha (incl. LID)*	80% 20%
Cost of production	*$ 1,961*	*[Max income $ 4,655] (excl. LID)* *- $ 788 (incl. LID)*	[-100%] -67%
Other income / Diversification	*$ 842 (excl. LID)* *$ 2,248 (incl. LID)*	*+$ 2,195 (excl. LID)* *+$ 788 (incl. LID)*	261% 35%

1) IDH (2020) living income Analysis
2) 621 CFA/kg (excl. LID), and 850 CFA/kg (incl. LID)
3) +358 CFA/kg (excl. LID), and +128 CFA/kg (incl. LID)
4) Voice Network (2019)

Discussion

- Year 5 pre-tax net income is $4,888 in the case of a farmer with young trees without diversification. The table to the left shows what changes to each key variable would yield a living income for a farmer over the same period.
- The LID is pivotal but not sufficient in mitigating the gap to a living income for cocoa farmers. Should Cargill choose to pay the Fairtrade living income Reference Price of 2,200 $/MT (2,0 $/kg) however, farmer would surpass the living income threshold
- Required change puts the price at 1.78 $/kg, which is below with the aimed price of the Ivorian Government (1.82 $/kg) but deviates significantly from the living income Reference Price set by Fairtrade (2.20 $/kg) and Oxfam (2.67 $/kg). [4)]
- With an average tree-age of 20-years (trees that are full matured cocoa-trees) production increase is dependent on a land-size increase or more effective use of inputs.
- The significant need for additional land dedicated to the cultivation of cocoa increase the risk for deforestation in the Ivory Coast.

Heatmap

With productivity (kg/tree) close to the limit, smallholders increasingly rely on a positive trend in cocoa-prices (CFA/kg) to earn a living income

Sensitivity analysis on Net-income for a young tree farmer without diversification in Year 5
USD/year

Farm gate price for marketable cocoa (CFA/kg (incl. LID: 229 CFA/kg))

Productivity (kg/tree)

	421	521	621	850	1,050	1,250	1,450	1,650	1,850	2,050	2,250
0.37	1,003	1,262	1,522	2,115	2,633	3,151	3,669	4,187	4,705	5,224	5,742
0.47	1,289	1,615	1,940	2,684	3,335	3,985	4,635	5,286	5,936	6,586	7,237
0.57	1,536	1,927	2,318	3,214	3,997	4,779	5,562	6,344	7,127	7,909	8,692
0.67	1,602	2,059	2,516	3,564	4,479	5,393	6,308	7,223	8,138	9,052	9,967
0.77	1,888	2,411	2,935	4,133	5,180	6,227	7,274	8,321	9,368	10,415	11,462
0.90	2,254	2,868	3,482	4,888	6,116	7,344	8,572	9,800	11,028	12,256	13,484
1.00	2,514	3,194	3,874	5,432	6,792	8,152	9,512	10,873	12,233	13,593	14,953
1.10	2,595	3,341	4,087	5,796	7,289	8,781	10,273	11,766	13,258	14,751	16,243
1.20	2,881	3,693	4,505	6,366	7,990	9,615	11,240	12,864	14,489	16,114	17,738

Modeled assumption, excluding LID

Modeled assumption, including LID

Living income threshold

Fairtrade Living Income Reference price

Discussion

- We have stress-tested the net income of a young tree farmer without diversification in year five against significant but potential swings up and down of cocoa farm-gate-price (CFA/kg) and cocoa productivity (kg/tree) while keeping other elements of net income constant
- This is a farmer who doesn't have an urgent need to start renovating yet as the average age of his plantation is 16 years old
- The modelled price of 850 CFA/kg (incl. LID) yields a living income with productivity with 1.10 kg/tree. With potential decreasing market prices, a farmer needs to even exceed the 1.10 kg/tree.
- Smallholders will increasingly rely on price increases (CFA/kg) increase to earn a living income, as current productivity (0.90 kg/tree) is based on a smallholder who fully utilizes potential productivity effects of fertilizer, crop protection, and GAP.
- Productivity of 0.47 kg/tree, which is comparable to **the Baseline**, yields a living income with a price close to 1,850 CFA/kg. With productivity declining due to age and diseases The living income Reference Price (1,210 – 1,468 CFA/kg) becomes increasingly important.

COOPERATIVE PERFORMANCE

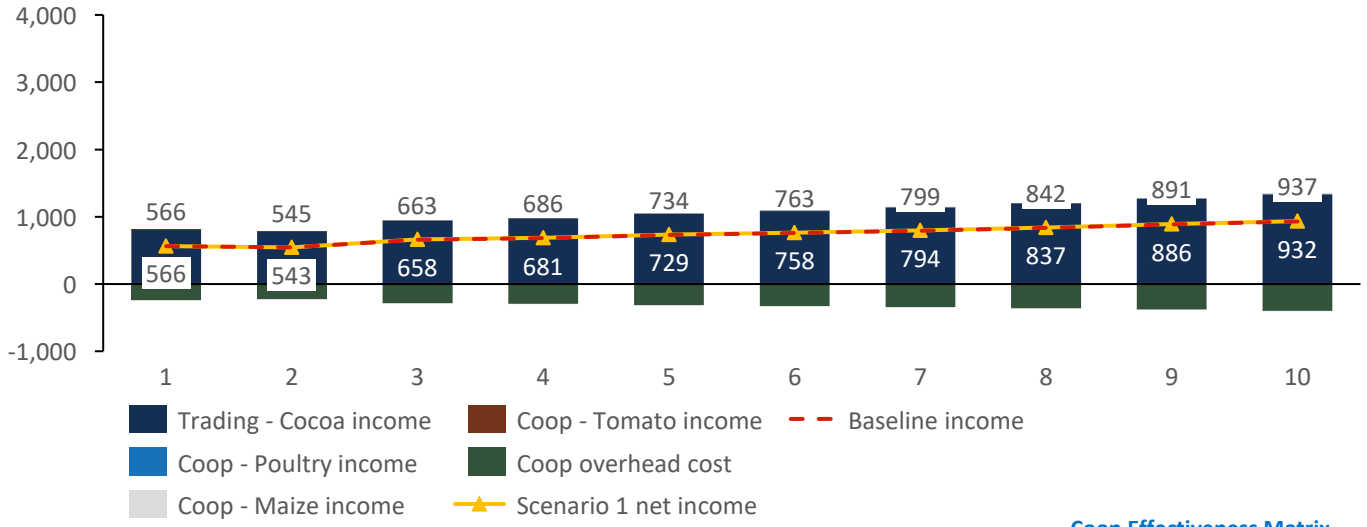
Assessing cooperative impact and opportunities for improvement

Cooperative net income – scenario 1

A cooperative is not expected to significantly increase its net income through breeding poultry and cultivating maize and tomato, although those activities may prove critical for effective farmer diversification

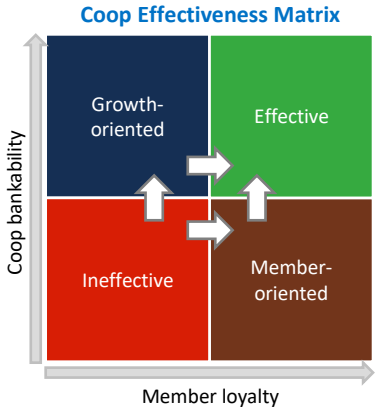
Cooperative profitability – Scenario 1 compared to Baseline

Net income in '000 USD



Scenario 1 matrix indicators

- Due to lack of complete financial data for the cooperative, it is not possible to reliably calculate a Debt Service Coverage Ratio (DSCR). However, based on current assumptions and considering a DSCR of 1.25 as a desirable and bankable reference, we expect the cooperative to be able to pursue a trade financing loan of ~437k USD/year in year 1 – **5%** of cocoa sales, and ~721k USD in year 10 – **6%** of cocoa sales
- Member transaction loyalty would come to **301** USD/farmer in year 1, and **298** USD/farmer in year 10



Scenario 1 discussion

- The estimation of the current income of the example cooperative in Central Ivory Coast, is reflected in the Baseline income in this graph. It consists solely of cocoa-related income and is assumed to grow over time as the number of members and thus volumes of cocoa traded grows
- In Scenario 1 we explore the financial impact on the example cocoa cooperative, of implementing the cooperative strategic diversification approach described earlier:
  - Coop poultry breeding
  - Coop cultivation of non-irrigated tomato and maize
  - Trading of cocoa (as per Baseline)
- From the comparison we can safely conclude that these activities will not have any significant impact on the income of the cooperative: the impact doesn't go beyond 5,000 USD/year
- However, these activities potentially have a part to play in supporting farmers in the implementation of their diversification and renovation activities:
  - poultry breeding creates labor opportunities for farmers eradicating their plantations infected by swollen shoot
  - tomato and maize cultivation create on-the-job learning opportunities for farmers considering diversification into these crops

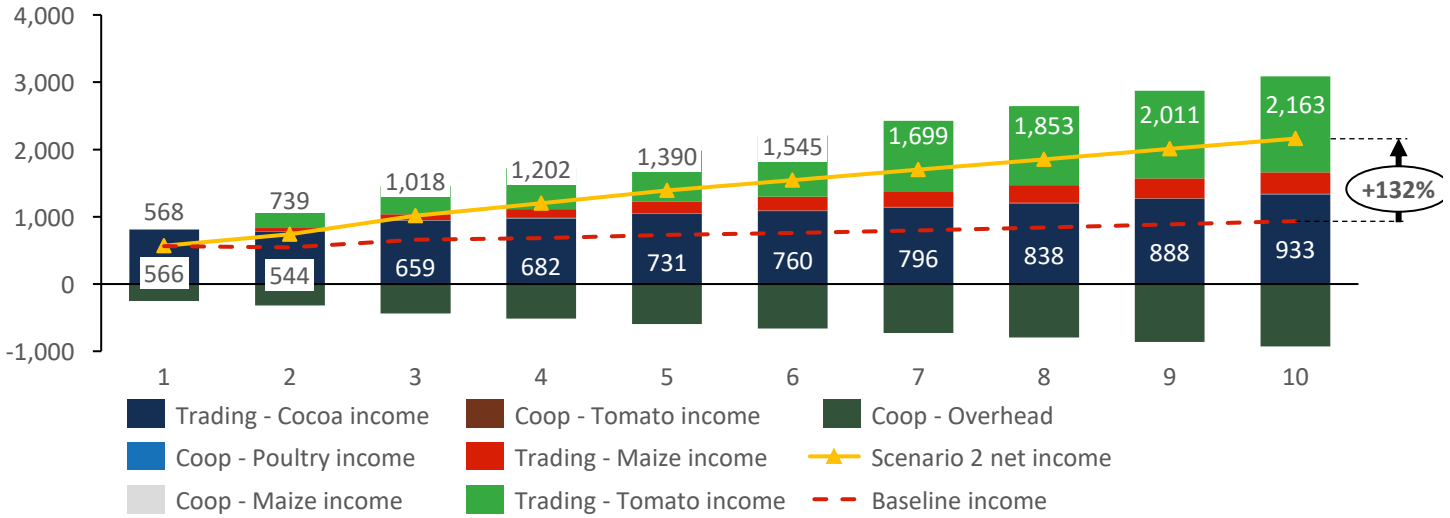
Example for cooperative in Central Ivory Coast

Cooperative net income – scenario 2

A cooperative is expected to significantly increase its net income once it starts trading its members' volumes of diversified crops, in this scenario maize and tomato

Cooperative profitability – Scenario 2 compared to Baseline

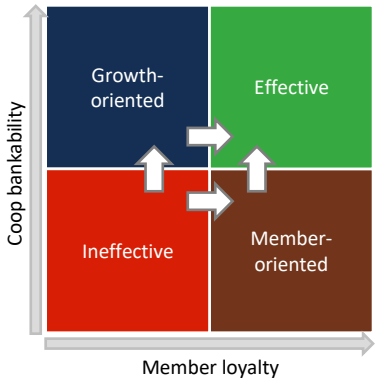
Net income in '000 USD



Scenario 2 matrix indicators

- Working towards a DSCR of 1.25, we expect the cooperative in Scenario 2 to be able to pursue a trade financing loan of ~442k USD/year in year 1 – **5%** of cocoa sales, and ~1,67M USD in year 10 – **14%** of cocoa sales
- Member transaction loyalty would come to **301** USD/farmer in year 1, and **688** USD/farmer in year 10

Coop Effectiveness Matrix



Scenario 2 discussion

- In Scenario 2 we explore the financial impact on the example cocoa cooperative, of implementing the cooperative strategic diversification approach described earlier:
  - Coop poultry breeding
  - Coop cultivation of irrigated tomato and maize
  - Trading of cocoa (as per Baseline), maize and tomato
- The graph clearly indicates the tremendous positive financial impact of trading maize and tomato for the farmers in this cooperative: in year 10 the cooperative income is 132% higher in Scenario 2 than in the Baseline
- Less obvious from the graph is that the income from irrigated tomato and maize is significantly higher than non-irrigated tomato and maize. However, for the total net income of the cooperative it still does not have any significance

Example for cooperative in Central Ivory Coast

ASSUMPTIONS

Key assumptions and background data and analyses

Key-assumptions SDM (1/3)

		Swollen shoot		Aged		Young	
Variable	**Baseline_0**	**Segment_1A**	**Segment_1B**	**Segment_2A**	**Segment_2B**	**Segment_3A**	**Segment_3B**
Exchange	550 CFA = 1 USD	550 CFA = 1 USD	550 CFA = 1 USD	550 CFA = 1 USD	550 CFA = 1 USD	550 CFA = 1 USD	550 CFA = 1 USD
# Farmers	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	[redacted]						
Attrition rate	[redacted]%	[redacted]%	[redacted]%	[redacted]%	[redacted]%	[redacted]%	[redacted]%
Adoption rate	[redacted]%	[redacted]%	[redacted]%	[redacted]%	[redacted]%	[redacted]%	[redacted]%

Variable	**Value**		
# Cooperatives	[redacted]		
	Fertilizer	**Crop protection**	**Training**
Service Adoption	2020: (adoption: *impact)* - Cargill SDM: 0% *(100%)* - Other: 35% *(50%)* - None: 65% *(0%)* 2024: - Cargill SDM: 20% *(100%)* - Other: 35% *(50%)* - None: 45% *(0%)*	2020: (adoption: *impact)* - Cargill SDM: 12% *(100%)* - Other: 60% *(100%)* - None: 28% *(0%)* 2024: - Cargill SDM: 12% *(100%)* - Other: 60% *(100%)* - None: 28% *(0%)*	2020: (adoption: *impact)* - Yes: 21% *(100%)* - None: 79% *(0%)* 2024: - Yes: 50% *(100%)* - None: 50% *(0%)*

Key-assumptions SDM (2/3)

Variable	Value	
Farm-gate-price (cocoa)	(year 1): [redacted] CFA/kg (year 2 – 10): [redacted] CFA/kg	Year 1: 20/21
Coop-gate (cocoa)	(year 1): [redacted] CFA/kg (year 2 – 10): [redacted] CFA/kg	Year 1: 20/21
Farm-gate-price (tomato)	(year 1 – 10) 545 $/Mt	
Farm-gate-price (maize)	(year 1 – 10) 182 $/Mt	
Certification premium	(year 1 – 10): [redacted] CFA/Mt (year 1 – 10): [redacted] CFA/Mt [redacted]% to Smallholder [redacted]% to Cooperative	(received) (paid)
Certificated volume	[redacted]% of Sourced volume	
Sourced volume	[redacted]% of Marketable volume = loyalty-%	
Staffing	Management: [redacted] FTE Financial: [redacted] FTE Field staff: [redacted] FTE	

Topic	Variable	Value
Swollen shoot (CCC)	Support for grubbing Input provision Financial incentive	40,000 CFA/Ha 5 Litre/Ha 50,000 CFA/Ha
Training	Certification cost Training trainers - # Trainings - Cost	[redacted]
	FFS Training - # Farmers - # Farmer per training - Cost	[redacted]
	- # FFS - Farmers per FFS - Cost	[redacted]
	Coop Training	[redacted]
Diversification training	Tomato	[redacted]
	Maize	[redacted]
	Agroforestry	[redacted]

Key-assumptions SDM (3/3)

Topic	Variable	Cocoa	Tomato	Maize	Agroforestry
Inputs	Insecticide				
	- Purchase price	4,750 CFA/bottle	13,750 CFA/bottle	16,406 CFA/bottle	
	- Sales price	5,000 CFA/bottle	13,887 CFA/bottle	16,570 CFA/bottle	
	Fungicide				
	- Purchase price	700 CFA/sachet			
	- Sales price	800 CFA/sachet			
	Fertilizer				
	- Purchase price	13,750 CFA/bag (50kg)	10,082 CFA/bag (25 kg)	22,000 CFA/bag (50kg)	
	- Sales price	15,000 CFA/bag (50kg)	10,182 CFA/bag (25 kg)	22,200 CFA/bag (50kg)	
	Seeds(lings)				
	- Purchase price	N/a	666 CFA/kg	3,500 CFA/kg	4.50 $/Sdl. (<20,000)
	- Sales price	93.50 CFA/Seedling	673 CFA/kg	3,535 CFA/kg	4.15 $/Sdl. (<190,000)
					3.50 $/Sdl. (<270,000)
Nursery	Establishment	640 $/Ha			
	Operating	1,122 $/Ha/year			
	Production	1,320 seedlings/Ha/year			
Certification	UTZ				
	- # Coops certified	2020: 102 / 2024: [redacted]			
	- Cost	[redacted] $/coop			
	Rainforest Alliance				
	- # coops certified	2020: 102 / 2024: [redacted]			
	- Cost	[redacted] $/coop			
Loan	- Cost of capital	[redacted]			
	- Outstanding				

Key-assumptions Cooperative

		Swollen shoot		Aged		Young	
Variable	**Baseline_0**	**Segment_1A**	**Segment_1B**	**Segment_2A**	**Segment_2B**	**Segment_3A**	**Segment_3B**
Exchange	550 CFA = 1 USD	550 CFA = 1 USD	550 CFA = 1 USD	550 CFA = 1 USD	550 CFA = 1 USD	550 CFA = 1 USD	550 CFA = 1 USD
# Farmers	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	[redacted]						
Attrition rate	[redacted]%	[redacted]%	[redacted]%	[redacted]%	[redacted]%	[redacted]%	[redacted]%
Adoption rate	[redacted]%	[redacted]%	[redacted]%	[redacted]%	[redacted]%	[redacted]%	[redacted]%

Topic	**Value**	**Cocoa**	**Tomato**	**Maize**	**Agroforestry**	**Poultry**
Farm-gate-price		[Key-assumptions SDM]	545 CFA/kg	182 CFA/kg		1,292 CFA/kg
Coop-gate-price		[Key-assumptions SDM]	573 CFA/kg	191 CFA/kg		

	Fertilizer	***Crop protection***	***Training***
Service Adoption	[Key-assumptions SDM]	[Key-assumptions SDM]	[Key-assumptions SDM]

Finance	DSCR	1.25
	Repayment	6 months
	Interest	1%/month
	Annuity	EBITDA/month
	Overhead	30%

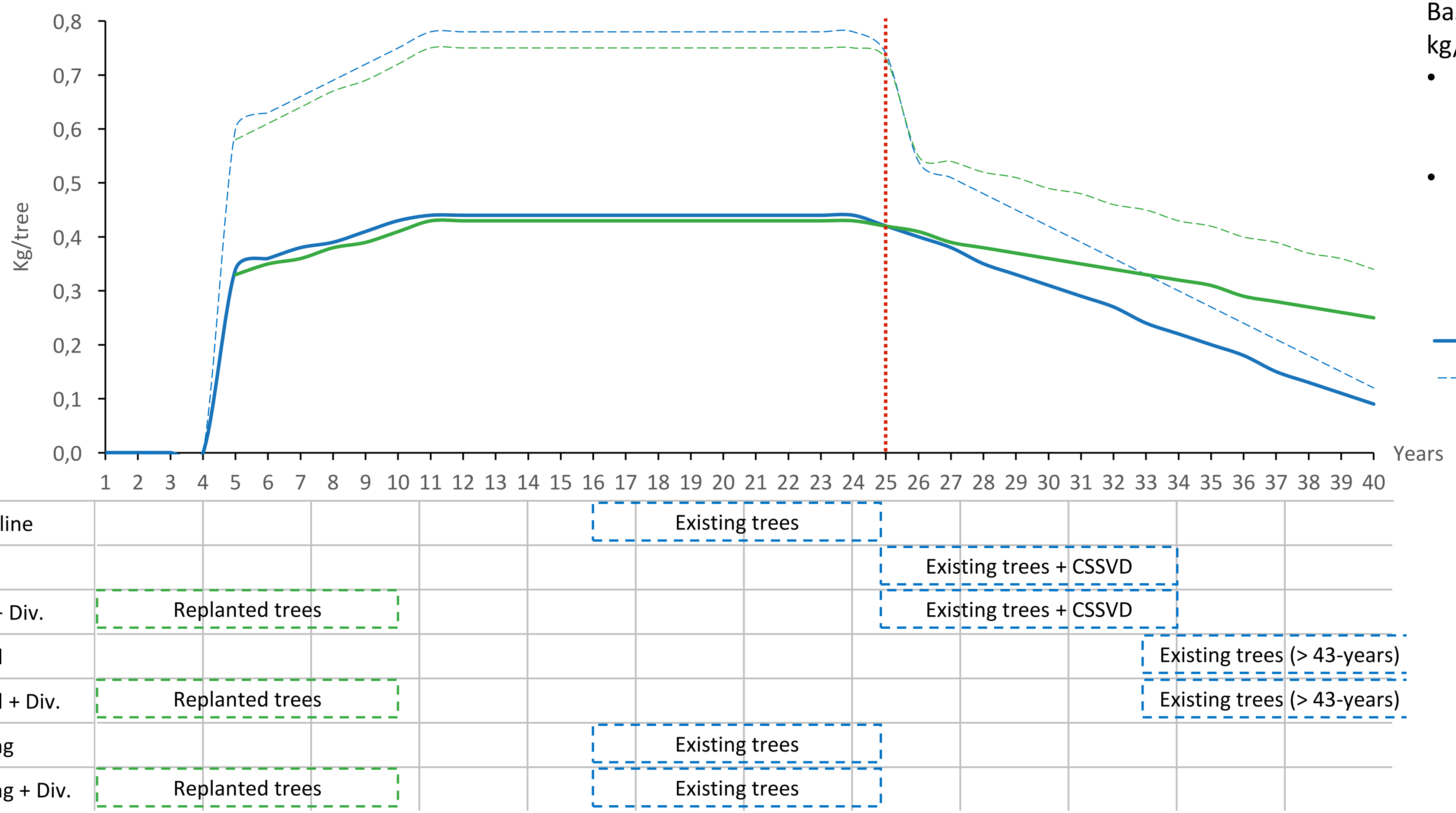
Key-assumptions Smallholder (1/3)

		Swollen shoot		Aged		Young	
Variable	**Baseline_0**	**Segment_1A**	**Segment_1B**	**Segment_2A**	**Segment_2B**	**Segment_3A**	**Segment_3B**
Farm size	6.7 Ha	6.7 Ha	6.7 Ha	6.7 Ha	6.7 Ha	6.7 Ha	6.7 Ha
Cultivation cocoa	52%	52%	52%	52%	52%	52%	52%
Cultivation non-cocoa	15%	15%	15%	15%	15%	15%	15%
Fallow-land	33%	33%	33%	33%	33%	33%	33%
Div. Fallow / Non-cocoa	No	No	Yes	No	Yes	No	Yes
Div. Cocoa	None	None	Rotation / Maize mono	None	Maize mono	None	None
Cacao tree density	1,222 trees/ha	1,222 trees/ha	1,222 trees/ha	1,222 trees/ha	1,222 trees/ha	1,222 trees/ha	1,222 trees/ha
Shade tree density	11 trees/ha	11 trees/ha	11 trees/ha	11 trees/ha	11 trees/ha	11 trees/ha	11 trees/ha
Average starting tree-age	16	26	26	33	33	16	16
Replanting	Continuous (3%)	Continuous (3%)	One-off (100%)	Continuous (3%)	Staggered (20%)	Continuous (3%)	Continuous (3%)
Cacao tree density	1,333 trees/ha	1,333 trees/ha	1,333 trees/ha	1,333 trees/ha	1,333 trees/ha	1,333 trees/ha	1,333 trees/ha
Shade tree density	12 trees/ha	12 trees/ha	12 trees/ha	12 trees/ha	12 trees/ha	12 trees/ha	12 trees/ha
Agroforestry	None	None	Mixed (20 inter / 80 boundary trees/ha)	None	Mixed (20 inter / 80 boundary trees/ha)	None	Mixed (20 inter / 80 boundary trees/ha)
Swollen shoot	None	10% farm 1st year: -25%, 2nd year: -75%, 3th year: -100%	10% farm 1st year: -25%, 2nd year: -75%, 3th year: -100%	None	None	None	None
Services	Cacao: None Tomato: None Maize: None	Cacao: All Tomato: None Maize: None	Cacao: All Tomato: All Maize: All	Cacao: All Tomato: None Maize: None	Cacao: All Tomato: All Maize: All	Cacao: All Tomato: None Maize: None	Cacao: All Tomato: All Maize: All

Back to Recommendations

Key-assumptions Smallholder (2/3)

Cocoa-yield curve



Baseline kg/tree compared to Agroforestry kg/tree in 40-year projection.

- Tree density of the Baseline farm is 1,333 cocoa trees/ha combined with 12 shade trees/ha.
- Tree density of the Agroforestry farm is 1,333 cocoa trees/ha combined with 20 shade trees/ha inter-cropped and 80 shade trees/ha boundary cropped.

Baseline excl. GAP | Agroforestry excl. GAP
Baseline incl. GAP | Agroforestry incl. GAP
Cut-off point for impact of applying fertilizer

Key-assumptions Smallholder (3/3)

		Swollen shoot		Aged		Young
Topic	**Variable**	**Cocoa**	**Tomato**	**Maize**	**Agroforestry**	**Poultry**
Yield	Starting yield	0.47 kg/tree (570 kg/Ha)	1,070 kg/ha/cycle	1,386 kg/ha/cycle	-	1.5 kg/chick
		0.73 kg/tree (excl. effects)	3,209 kg/ha/cycle (incl IR)	2,000 kg/ha/cycle	-	N/a
	Cycles		3 #/year (mono)	2 #/year (mono)	-	5 #/year (mono)
Productivity	Fertilizer	40%	67% (fert. + crop p.)	45% (fert. + crop p.)	-	-
	Crop protection	9%	67% (fert. + crop p.)	45% (fert. + crop p.)	-	-
	Training (GAP)	27%	20%	25%	-	-
	Post-harvest loss	0%	30% - 15%	15% - 5%	-	-
Effects Agroforestry on cocoa yield kg/tree	Shade tree /ha (in '00) Cocoa tree /ha (in '000) %-percentage disease/ha	-0.1935 kg/ '00 trees -0.1966 kg/ '000 trees -0.0128 kg/ %				
Total labor needed	Days/ha	99 days (400 – 550 kg/ha)	90 days (1-cycle) + 1 day / 1,111kg	114 days (1-cycle) + 1 day / 9,000kg	-	150 days (1-cycle)
	Cost	3,750 CFA/day	3,000 CFA/day	3,000 CFA/day		3,000 CFA/day
Home consumption	Kg	None	335 kg/annually	335 kg/annually	None	None

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