



FARMER SEGMENTATION, DEVELOPMENT OF LOAN PRODUCTS FOR
SMALLHOLDER COCOA FARMERS AND PARTNERSHIP BUILDING WITH
FINANCIAL INSTITUTIONS IN WESTERN NORTH REGION

Data Collection & Credit Scoring Report

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Financial Access Consulting Services B.V.
Emmaplein 2
1075 AW Amsterdam
The Netherlands
Tel. +31 (0)20 572 0760

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Introduction

The urgently needed replanting of almost 40% of Ghana's smallholder cocoa farms (>700,000 hectares), represents a financing gap of about \$1 billion. This current shortfall threatens the livelihoods of 800,000 households and exacerbates what is already the largest driver of forest loss in Ghana's high forest zone - forest encroachment for new cocoa plantations.

SNV is engaged in projects with smallholder cocoa farmers in the districts Juabeso and Bia West in the Western North region of Ghana. To help smallholders improve their incomes in a sustainable manner, Financial Access Consulting Services (FACS) was engaged to help catalyze commercial finance into the landscape to support better use of inputs and eventually towards cocoa replanting and post replanting management services. In the short run this will be addressed by working closely with local financial institutions (FIs) to enhance their operations and procedures and help them supply input financing to smallholders. In the long run, a more holistic approach, combining investors, FIs, value chain actors and smallholders groups will be needed to operationalize a replanting finance scheme.

The activities undertaken by FACS are aimed at understanding the conditions, challenges and opportunities in the landscape and to help design and operationalize innovative financing schemes in the landscape. This can only be done by identifying institutional gaps in current replanting schemes, building and understanding of the credit needs of farmers, and quantifying the costs and risks to FIs in engaging with smallholders. In addressing these challenges and leveraging the strengths present in the area and within the various institutions, can an innovative financing scheme be designed that presents a strong, low cost and low risk investment case to all actors involved, giving them the tools and confidence to invest in smallholders.

This report summarizes and discusses the activities under Output 1, data collection and credit scoring. First the questionnaire development process will be highlighted. Followed by an overview of the training and data collection activities. Next an overview of the collected data will be given. Finally, the credit scoring logic will be discussed and the main insights that can be learned when applying it to the collected data.

KYC Questionnaire Development

After the initial discussions with Amenfiman Rural Bank, Sefwiman Rural Bank and Suma Rural Bank all institutions were asked to share any information regarding their current onboarding procedures. Suma shared their KYC form, which was very limited in scope. It included some of the main farm income and expense categories, but did not focus on other income sources, household expenses or asset ownership. Sefwiman shared a high-level overview of their scoring logic. However, it did not include the specific questions or cut-off points used in their assessments.

The FACS team therefore did not use either inputs as a blueprint from which to start the creation of the KYC questionnaire. Rather, previously used questionnaires, tailored to perennial crops were adjusted to the Ghanaian and cocoa context. This process was partially informed by the focus group discussions that were had in March and partially by cocoa-specific research in the Ghanaian context. A full copy of the questionnaire can be found as an attachment to this file. Generally, it focusses on nine categories. First, demographic information, where the most important questions focus on the size of the household and the quality of the house of the interviewee. Second, information about the individual farm plots, where key information is the age of the plantation and how far the plot is from the respondent's house. Third, yield information over the past 3 years is asked, along with to which license buying companies the interviewees sold their produce. As prices are centrally determined for cocoa in Ghana, no price information was asked. Fourth, other income, either from other crops grown on the farm or from off-farm activities. Fifth, expenses at both the farm and household level. Sixth, specific questions were generated with input from SNV regarding what agricultural practices farmers use, such as the number of different fertilizers used, and the number of fertilizer applications completed per year. Seventh, household assets, first focusing on money and money-equivalents and second whether each household owned a list of basic large household items. Eighth, information regarding outstanding formal and informal loans was asked. Last, each interviewee was asked whether they have a financing need and what their ideal loan size would be for cocoa inputs.

Taken together these questions provide a holistic overview of the interviewee's financial situation and provided all the inputs needed for FACS's scoring model. In total, the questionnaire had 158 questions. However, due to some questions being asked only to certain farmers, 112 questions were answered on average per questionnaire. An example of this is that the questionnaire asked very specific questions about each plot that a smallholder farms, meaning that if they farm on only 1 plot, fewer questions are asked and answered than if a farmer holds 4 plots.

Questionnaire Administration

Due to COVID-related travel restrictions, the FACS team was unable to conduct in-person selection and training of enumerators for the administration of the questionnaire. However, with SNV's help ten enumerators who had worked for SNV before we contacted and contracted. The enumerators were trained by FACS in a three-hour session on June 9th over Microsoft Teams. The training consisted of three parts. First the general objectives of the project and the data collection exercise were discussed to ensure all participants had a clear

understanding of what we were trying to accomplish. Next an overview of the various sections and questions was given, where especially for the more finance-related questions, the meaning of the questions was discussed in depth. Later the functionalities of LendXS Collect, the app used for the data collection, was discussed. Finally, there was ample time for completing practice surveys and asking questions about the various topics. The presentation used during the training can be found as an annex to this report. Furthermore, the entire training session was recorded and shared with SNV, so that enumerators could still view the training if they were unable to join it due to connectivity issues.

The ten enumerators administered the questionnaire between August 8th and August 29th. In this period, they completed a total of 1006 interviews, with each enumerator having done between 99 and 102. The SNV and FACS team were in close contact during the fieldwork, to troubleshoot any issues and answer questions quickly. Apart from the question of how yields should be gauged for newly planted plots, no major issues arose during data collection.

Summary of Data

Once data collection was completed, the data was cleaned and analysed by FACS. An anonymized version of the clean dataset will be attached as an annex to this report, though the non-anonymized version will be shared with the partner financial institution(s) to help them easily reach out to the farmers interviewed. An overview of the main datapoints is given below, followed by an in-depth discussion of the credit scores.

Apart from all the questions mentioned above, the questionnaire recorded the GPS coordinates of the interview. A map with an overview of the farmers' locations, which may not be fully accurate, but nonetheless gives a good overview, is given in Figure 1. To overcome this limitation, their addresses were also asked directly, which may prove more accurate and useful for an MFI to base their decisions on.

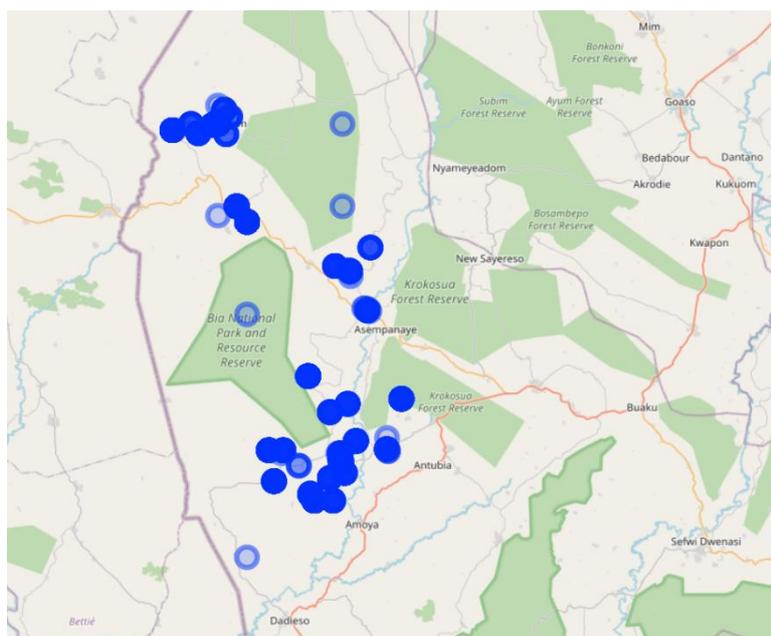


Figure 1 - Smallholders' locations.

Two-thirds of farmers are male, and the median age for the interviewees is 44, but ranges from 18 to 80. The full distribution of ages can be seen in Figure 3.

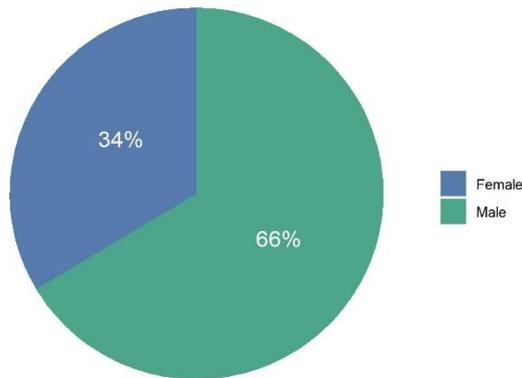


Figure 2 - Age.

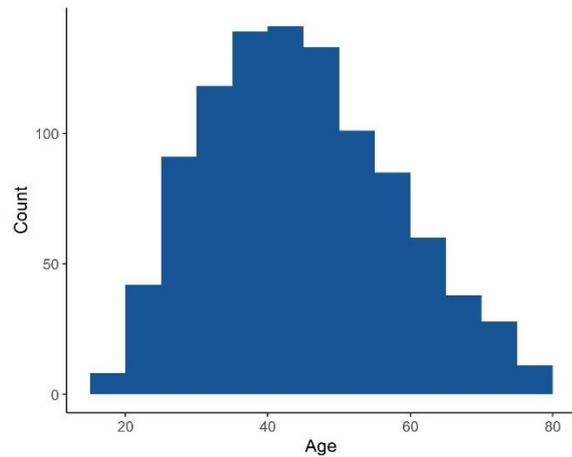


Figure 3 - Gender.

55% of farmers hold just 1 plot on which they grow cocoa, with another 26% farming on 2 plots. The median land size is 8 acres (3.2 hectares), but there is significant variance between farmers, as can be seen in Figure 4. Yields per acre vary widely across farmers. This is mostly explained by the fact that over 161 farmers have undertaken some replanting since 2017, meaning that these plots have not reached maturity yet. Of these farmers, two-thirds (104) have conducted full replanting and their yields hardly reach over 4 bags of cocoa for their entire farm, and over half harvest 1 bag or less. The mean yield per acre is 2.7 64-kilo bags over the past 3 years, indicated in red in Figure 5. Furthermore, 42% of farmers have a share-cropping agreement, under which they only keep half of their harvest on average, with the other half going to the owner of the plot.

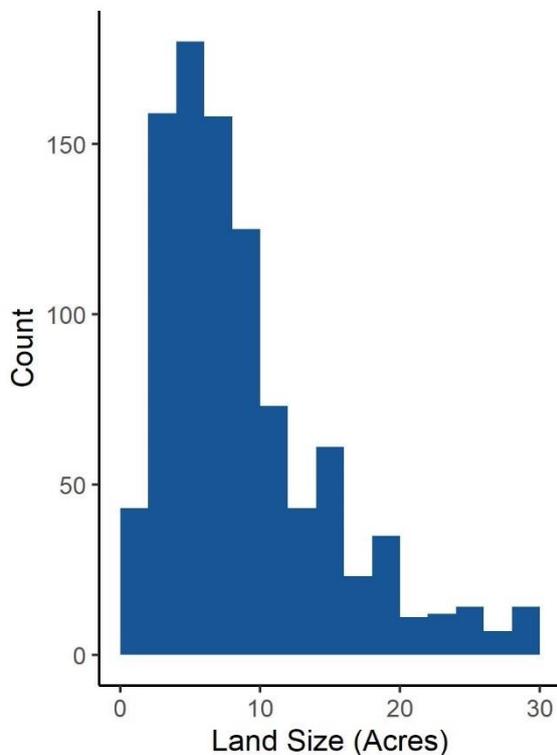


Figure 4 – Total farmland size.

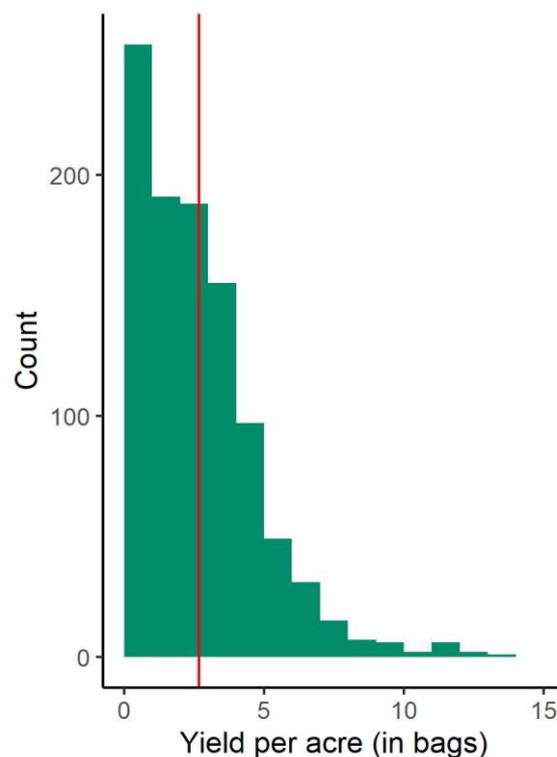


Figure 5 – Yield per acre (in bags).

Credit Scores

Though these summary statistics give a good overview of the distribution of the various variables of interest, they provide limited information on the individual farmer level and the relationship between the different variables. To address this limitation, and to assess the creditworthiness of farmers directly, the individual responses to the questionnaire were used to create credit scores.

These credit scores are calculated by considering 15 individual credit risk drivers, across 4 categories. A full breakdown of these risk drivers is given in Table 1.

Category	Risk Driver	What it measures	Importance
Applicant Profile	Education	Highest education level passed by the individual	23%
	Age	Age	
	Agri space per family member	Total farm size divided by the number of household members	
	Experience with formal borrowing	Whether they have ever received a loan from a formal institution	
Ownership & Collateral	Land ownership	Number of acres of farmland for which they hold a land title	25%
	Fixed Assets	Number of assets owned out of a pre-specified list	
	Savings	Total value of savings in cash, at a formal institution or at a Village Savings and Loans Association (VSLA)	
	House condition	An index capturing the material of which their walls and roof are made	
Farm Management & Farm Profile	Years of experience	Years of experience growing cocoa	17%
	Farm training	Indicator whether they have received farming or Good Agricultural Practices (GAP) training	
	Yield expectations	An index capturing whether their realized yields were in line with their expectations and the reasons why this was the case	
	Agronomic practices	Implementation of certain GAP practices on the farm	
Financial Profile	Affordability	Requested loan size compared to their annual net income	35%
	Income diversification ratio	Non-cocoa income divided by cocoa income	
	OPEX ratio	OPEX ratio of the cocoa farm	

Table 1 – Credit risk drivers.

The credit scores calculated using this method therefore consider a wide range of credit risk drivers. The risk drivers, their weighting and cut-off points were determined by Financial Access based on best practices, FACS's international experience, FACS's experience with cocoa smallholders in Ghana as well as on the data of the 1,006 smallholders in the dataset. The credit scoring information that Suma Rural Bank shared, is incorporated into the framework as well, though not explicitly so. This is because their model is not detailed nor can indicators such as 'character' be properly quantified or even assessed by enumerators. From the credit scores the smallholders received, they were put into one of 5 categories, ranging from A to E, where A holds those farmers with the best scores.

The distribution of Credit Scores can be seen in Figure 6. It has a rough bell-shape, though it is skewed to the left. Overall, 40 smallholders gained over 70% of the total points available, putting them in category A. Another 242 smallholders have a high score (B). However, the largest group (570) of smallholders fall into category C, where it is hardest to determine whether they are financeable or not.

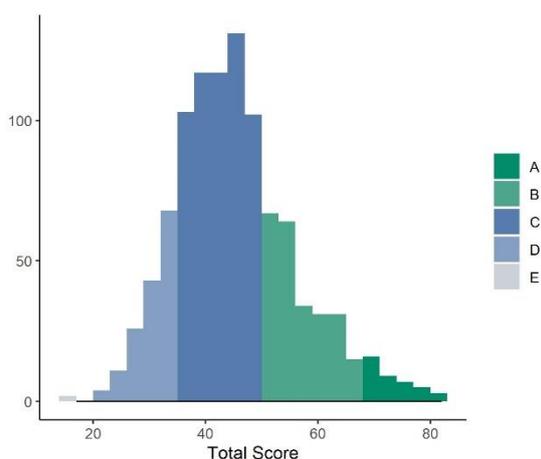


Figure 7 - Credit Scores.

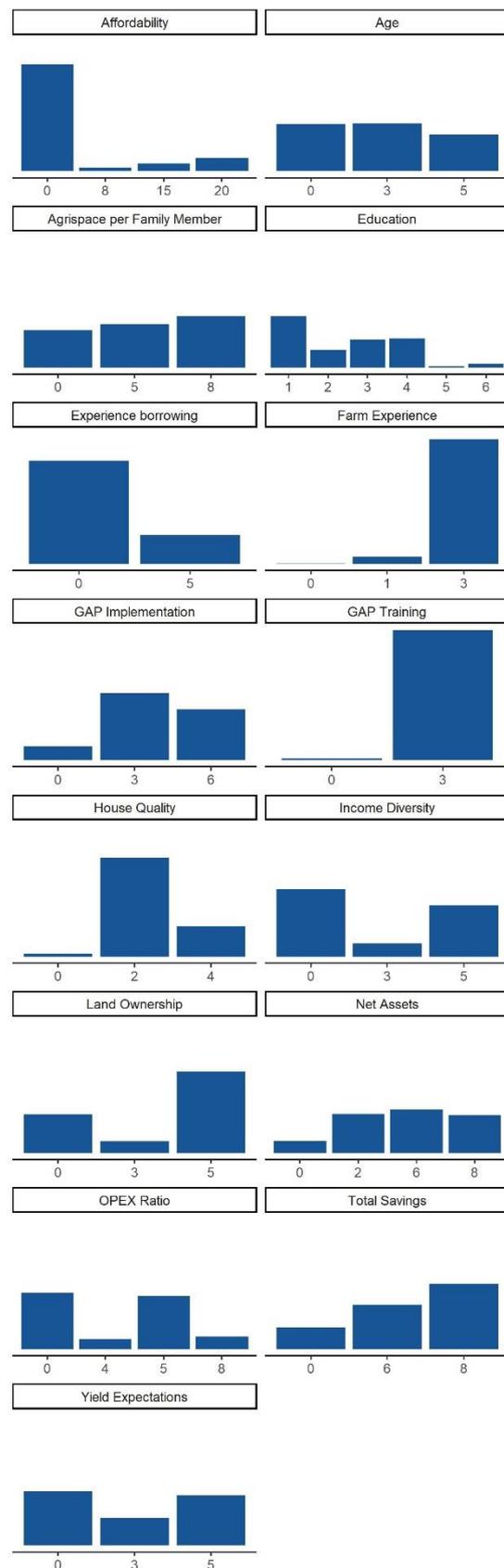


Figure 6 - Breakdown of scores for each Credit Risk Driver.

The main reason why so many farmers score in the middle range, is because many farmers' requested loan size is rather large compared to their annual income. This can be seen in Figure 7, where a breakdown of the scores for each credit risk driver is given. Whereas most risk drivers create a good segmentation between individuals scoring low, high or medium scores, the scores for affordability are low across the board, indicating that requested loan sizes are too high. This points to the importance of a partner financial institution closely examining the loan size that would be disbursed to smallholders.

Another way to consider the credit scores, is to examine their composition across the 4 risk categories, which is given in Figure 8. The vertical lines in the figure track the cut-off points between the 5 categories, with E on the left and A on the right. From this figure we can clearly see that the average scores in the Applicant Profile and Farm Profile categories hardly change between the 5 categories. Average scores for Ownership & Collateral increase steeply between categories D and C, but remain stable between C, B and A. The main category that therefore determines whether an individual farmer moves from category C to the clearly financeable buckets of B and A is given by their financial profile.

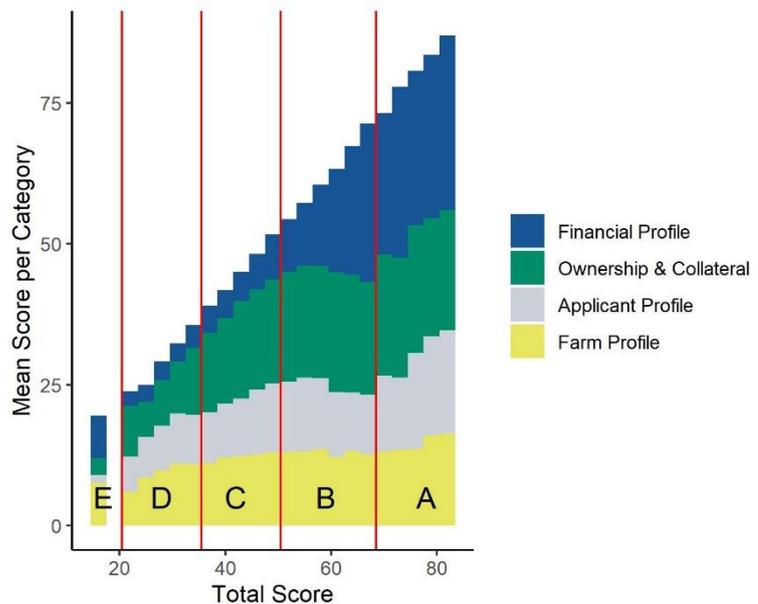


Figure 8 - Breakdown per Risk Category for each Credit Score.

The average score for the financial profile in category C is a low 5.9, but increases to 14.6 in category B and 27.6 in A. This again stresses the importance of ensuring that farmers' requested loan size is examined in detail, and lowered where necessary, by the partner financial institution. Comparing the requested loan size to input needs and ensuring that the loaned money is only used for productive activities are key considerations here.

Loan Value

To investigate the loan value in more detail, consider Figure 9, which gives a boxplot of the requested loan size. The green box contains the middle 50% of requested loans, with the horizontal line indicating the median. The two 'tails' stretching out from the box capture the lower and upper 25% of requests. The dots indicate outliers, which are much higher than any other requests made. From this figure we can see that those in category A generally request the smallest loans, improving their

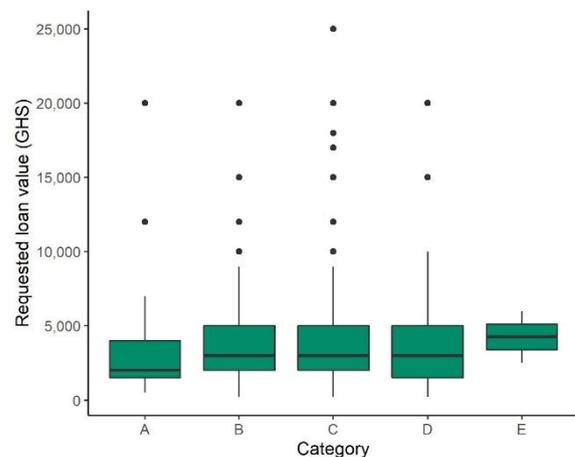


Figure 9 - Requested loan value.

affordability. However, between categories B, C and D there seems to be little difference in the requested loan sizes, meaning that the farmers in category B have higher incomes than the others, improving their affordability even though their loan size is the same.

Affordability

As the requested loan size seems to have an outsized adverse effect on the overall credit score, let us consider the credit scores without taking affordability into account. The cut-off points for the final categories are adjusted to consider the loss in weight for the Financial Profile category.

The resulting scores are shown in Figure 10. This shows that, as can clearly be expected, the total scores shift to the left, and a maximum score of only 69 is achieved. However, we also see a decisive shift in smallholders moving up in their final risk category. In this model 74 farmers are classified in category A with another 544 in B.

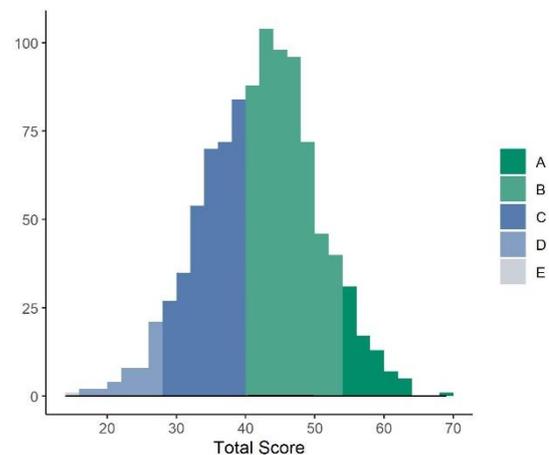


Figure 10 - Credit scores without affordability.

It must be stressed however, that this approach is not recommended. Even though the overall number of smallholders classified as financeable increases, there are disparities at the individual level. For instance, 31 farmers move from category C to B, even though 367 smallholders make the opposite shift. Thus, though on average more farmers move up than down, there are 61 farmers who drop in their final score. Furthermore, as affordability, or the ratio to income to loan repayments, is a key determinant of repayment risk, not considering it in a credit score is a significant lapse of judgement.

Conclusion

From the full analysis FACS conducted on the credit scores, only the important parts of which is discussed in this report, three main conclusions can be drawn. First, the credit scores successfully distinguish financeable farmers from non-financeable ones. This is evidenced by the fact that the two main categories determining credit scores are the Financial Profile and Ownership & Collateral. Second, attention must be paid to the loan size requested by farmers. As data collection was done by enumerators, smallholders may not have realistic answers to this question, overstating their financial needs. Before acting on these data, a financial institution must therefore carefully consider the appropriate loan size for farmers, especially for those in category C. Third, as some smallholders have conducted (partial) replanting, their stated yields might be particularly low. It is therefore important to not only consider their current income and repayment capacity, but also their repayment capacity when the new trees start becoming productive.

Recommendations

There are three clear activities that follow from the collected data described in this report. First, the scored data will be shared with at least one partner financial institution to help them onboard new smallholder clients. The fact that the data is pre-collected and analysed means that the onboarding costs are brought to almost zero for them, which will entice them to provide financing as widely as possible, within their risk parameters. Second, the insights from the data will be used to inform the training program at the financial institution, to help them more effectively overcome the main issues flagged in the data. The training program will be demand-driven and will leverage the insights discussed in this report to provide actionable and relevant examples and practices that could easily be operationalized. Third, and closely related, the specific methodology of the credit scoring employed will be shared with and explained to the financial institution. This will focus more on building the capacity of the institution to conduct proper, well-informed, credit scoring methods in their daily business, rather than a mere explanation of the process.

In conclusion, whereas the first follow-up focusses on the financial institution 'getting a foot in the door' in agricultural finance, the latter two activities ensure that the lessons learned in the process can be leveraged across value chains and that the benefits of the project will long outlive the life of the project.