

Commercial Opportunities to Expand Financial Services: Agriculture

Applicable Findings from the SOFIA Dataset

This report was sponsored by:

SAFIRA

Strengthening Agricultural Finance in Rural Areas

Strengthening Agricultural Finance in Rural Areas (SAFIRA) is a multi-year program under AIPRural aimed at developing and formalizing value chain financing with selected partners in eastern Indonesia to benefit smallholder farmers. Value chain financing is one way to scale-up cost effective, appropriate and sustainable lending to smallholder farmers without increasing transaction costs. SAFIRA partners with financial institutions, financial consultants, agri-businesses and farmer's groups to increase the incomes of up to 6,000 farmers. SAFIRA works in East Java, West Nusa Tenggara, East Nusa Tenggara and Papua. SAFIRA is part of PRISMA and is supported by the Australian Government and Bappenas. Implemented by Palladium with technical assistance of Swisscontact.

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This report uses data analytics to extract actionable insights from the SOFIA dataset, which describes access to finance for almost twenty thousand respondents across four provinces in eastern Indonesia. It is expected that the extensive and representative survey used for collecting the information contained in SOFIA will enable the findings to generalise to the whole of Indonesia and remain relevant for many of SAFIRA's partners.

The magnitude and nature of relationships between a range of explanatory variables and different outcomes is measured using a correlation analysis and facilitates the construction of customer profiles. This helps to segment customers based on a few key variables and offers potential for targeting distinct customers with known attributes and preferences. Three separate indices are used in this report to analyse the respondents:

An access to finance index (AFI) is constructed to represent the graduation of individuals along a pathway from being financially excluded to formally banked.

A financial services index (FSI) is constructed to measure the degree of activity of each respondent in relation to four distinct financial services: savings, payments, loans and insurance.

A financial literacy index (FLI) is introduced to measure the level to which respondents stated that they understood the information received from financial institutions associated with bank accounts and credit products.

Analysis of these indices can enable financial institutions to identify districts that have the most potential for increasing access to finance while also being mindful of having a sound commercial business case. The probabilities of respondents utilising different financial services are compared to understand the level of demand and measure the potential for cross-selling these services. A consultative process that combined the results of the data analytics with feedback from SAFIRA resulted in the identification of seven opportunities and a number of specific target segments. The various insights that have been extracted are carefully described and accompanied by recommendations for implementation.

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Introduction



The Australia-Indonesia Partnership for Rural Economic Development (AIP-Rural) is a suite of programs that improves smallholder farmers' access to new markets, better inputs, knowhow, technology, irrigation, and small loans.



Its goal is to achieve a sustainable 30% increase in the net incomes of 300,000 male and female smallholder farmers in Eastern Indonesia by 2018. AIP-Rural operates in East Java, West and East of Nusa Tenggara, Papua and West Papua.

The program focuses on agricultural sectors that display strong growth potential and are the main source of income for many smallholder farmers. All of this is done via co-investing in new business models with local, regional, national and international market players to create business models that improve the agriculture sector's competitiveness, especially for smallholder farmers.

Strengthening Agriculture Finance in Rural Areas (SAFIRA) aims to improve smallholder farmers' access

to essential financial services, such as business and investment capital loans. It is a three-year project that is part of the Government of Indonesia (GoI) strategy to accelerate poverty reduction through inclusive economic development. SAFIRA will focus initially on East Java, West Nusa Tenggara (NTB), and East Nusa Tenggara (NTT). It is supported by BAPPENAS and the Australian Government's Department of Foreign Affairs (DFAT) under the Australia-Indonesia Partnership for Rural Economic Development (AIP-Rural).

SAFIRA facilitates a financial service model that can answer to farmers' specific needs through a partnership between formal and informal financial institutions in rural areas. SAFIRA will also focus on agriculture value chain finance (VCF) to expand smallholder farmer access to finance. This will be achieved through key market stakeholders (including but not limited to input retailers, collectors, traders and manufacturing companies) in the value chain. VCF is made possible by value chain relationships and mechanisms. SAFIRA will work with partner financial institutions (PFIs), small and medium enterprises (SMEs) (e.g. seed producers, other input suppliers, collectors, processors, other traders) and farmers to equip them with the skills and capability to engage in sustainable applications of VCF.

SAFIRA's intention is not only to support financial institutions and other value-chain actors to utilize the available information about VCF and strengthen the institutional capacity in VCF at each level but also to strengthen the support system surrounding financial institutions in the guidance and implementation.

Background

In 2016-2017 SAFIRA commissioned a financial access survey, SOFIA, similar to FinScope in methodology.

The study looked at the demand side of financial access across five provinces in Indonesia. One of the intentions of SOFIA was to use this dataset to inform financial sector partners about the potential customer base so that they may adequately design products and services and better meet the needs of the rural populations.

SAFIRA commissioned this research to provide further analysis of the SOFIA dataset so that its partners can draw relevant conclusions from the results.

This report focuses on measuring access to finance by using the variables collected from almost twenty thousand respondents in the SOFIA database. The motivation for improving access to finance is predicated on the understanding that the more people that use financial products, the greater the impact on national policy objectives. In many situations, however, “using” is overoptimistically equated with “having”, yet there is growing evidence that having access is not the same as using. Simply counting the number of bank accounts or even those with a minimum balance is a poor substitute for evaluating the rich information that can be gleaned from financial transactions, which is a more accurate representation of access. For this reason, this report focuses on the analysis of financial services activity reported by respondents as this offers more accurate information about the kind of economic activity that is actually taking place.

This report addresses the challenge pertaining to increasing access to finance in rural areas. Many financial institutions are reluctant to operate in rural areas or develop products tailored to rural communities because of three main barriers:

1. Rural customers are difficult to reach;
2. increased transactions costs compared with urban operations; and
3. rural farming communities are perceived as representing a higher risk than urban communities.

The goal is to build on the information contained in the SOFIA dataset to provide new insights and knowledge for SAFIRA's partners. Specifically the aim is to extract explanatory variables that describe people and to link these to relevant dependent variables that represent human behaviour and outcomes in relation to financial services. This is best achieved as a combination of data analytics and human expertise whereby the wealth of knowledge embedded in members of SAFIRA and its partners have been pulled together to complement the analytics in an iterative manner. This has given rise to a number of concrete ideas for testing that we offer as opportunities for the financial institutions.

The historical data that has been collected in SOFIA is extremely informative and has the potential to support future innovative services for reaching new customers in rural areas. This leap from a survey of just under twenty thousand respondents to the entire country relies on the quality of the SOFIA database and the ability of predictive analytics to offer insights that are relevant in the future. The approach is to consider different

variables to segment the customer base, build customer profiles and then to target specific groups of customer in relation to innovative products.

SAFIRA has commissioned the SOFIA survey and analysis of the resulting dataset in order to directly inform policymakers and financial service providers as to main barriers to providing rural communities with better access to finance. In this report, access to finance refers primarily to four services: savings, loans, payments and insurance. Two overarching themes are considered in parallel: women and financial services and agricultural value chain finance.

Alongside the data analysis and findings, the project involved the following activities:

1. A meeting with selected staff and stakeholders to gain an insight on relevant data points.
2. Reviewing the data and outcomes for relevant findings.
3. Presentation of the key findings and seven opportunities for SAFIRA's partners.

The presentation and report have been structured so as to include:

1. Relevant insights (commercial value) for FIs to appeal to rural populations, farmers (men and women).
2. Suggest means by which financial institutions might be able to bridge the gap to meet the needs of the market (with reference to value chain finance).
3. Potential number of customers in agriculture sector as well as potential women borrowers (as part of the commercial case).
4. Potential agriculture VCF product/ services for each types of financial institutions.
5. Provides market outlook and appropriate recommendation related to agriculture financing for policy maker in banking industry, financial institutions association and at Government level.

The report starts by describing the SOFIA dataset and the various categories of questions that were asked during the survey. An initial descriptive statistical analysis provides an overview of the variables, their values and some context. A detailed statistical analysis was then undertaken to derive relationships with specific outcomes relating to the usage of financial services and binary status variables. The results obtained by applying these techniques to the SOFIA database are then presented in the results section. A number of opportunities are identified specifically for financial institutions based on interactive discussions with partners. Finally a discussion of the key findings and recommendations for partners and policymakers are presented in the concluding section.

Data

The SOFIA database was completed in 2017 and contains information about almost twenty thousand respondents across four provinces in Indonesia. The approach taken in this research project is to perform an empirical analysis of the available variables collected in SOFIA. This data-driven research relies heavily on the accuracy and availability of the data collected during the survey.

The questionnaire provides information about the following categories:

Demographic characteristics	Income sources	Ownership of assets
Ownership of land	Use of financial services	Access to savings
Access to loans	Access to payment services	Access to insurance

Examples of specific explanatory variables include:

- Access to financial services (formal and informal)
- Demographic indicators (gender, age)
- Geographic information (urban and rural)
- Income sources (frequency and methods)
- Information about land (farming/ownership)

A number of dependent variables were defined as these allowed the data analytics to better understand the outcomes relating to:

-
- Who is excluded and who is banked?

 - What sources and methods do people use to receive their income?

 - How often do people receive their income?

 - Financial literacy relating to bank accounts and credit products

 - How, why and how much are respondents saving?

 - How is credit accessed?

 - Are people using payment services for receiving and sending money?

 - Are people insured?
-

Access to Finance

There are many definitions of access to finance. The World Bank offers a workable definition that describes access to finance as “individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way.”

The SOFIA survey uses a number of binary yes/no questions to monitor exclusion and other aspects of access such as semiformal access, informally served, formal non-banked and banked (Figure 1).

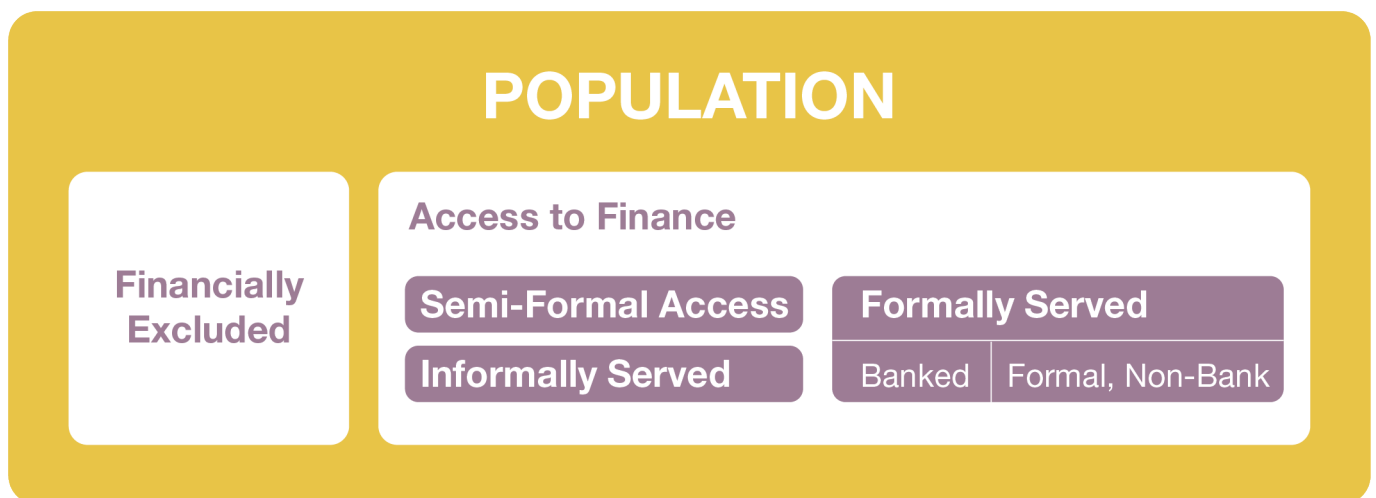


Figure 1: Schematic diagram showing how the population can be disaggregated by considering access to finance.

The percentage of excluded versus age disaggregated by location and gender is shown in Figure 2. It shows that the curves have a similar shape for each gender and that the minimum level of exclusion occurs at 35 years for females and 45 years for males. Rural males are most likely to be excluded when less than 50 years of age. Urban females is the custom segment least likely to be excluded for all ages.

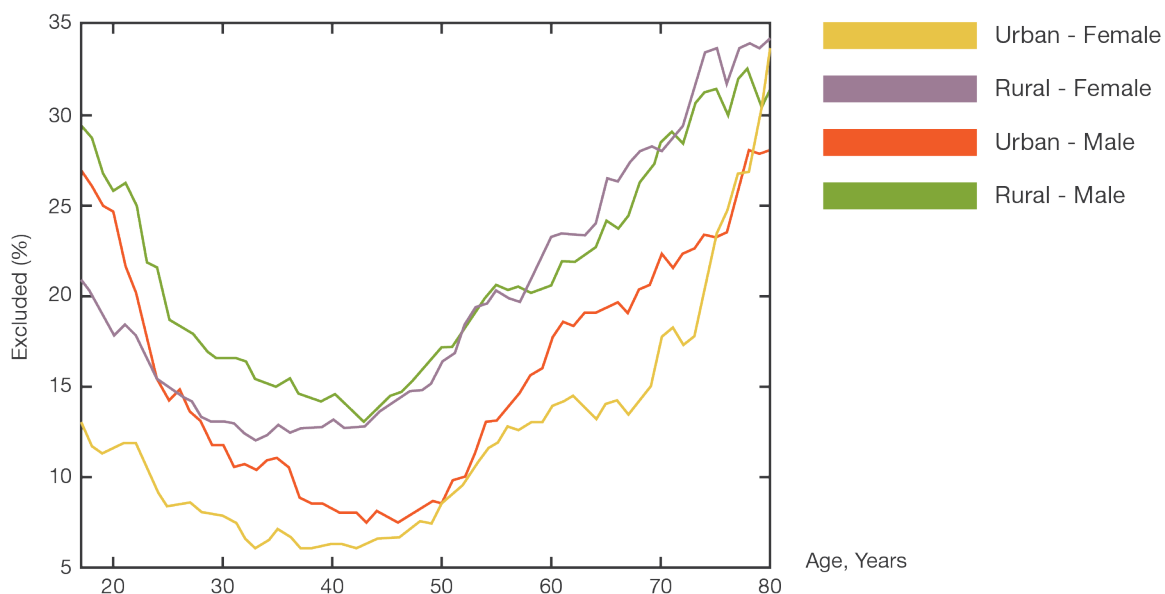


Figure 2: Percentage excluded versus age for different location-gender groups.

Comparing excluded and banked respondents is informative and helps to understand the key drivers that influence these outcomes. In many ways, it may not come as a big surprise that exclusion and banked respondents are at opposite ends of the spectrum and that low or high performance on education, income, PPI and assets scores is predictive. Similarly it is no surprise that rural communities are predominantly excluded. However the ability to distinguish between different age groups is useful and we find that the middle-aged respondents are most likely to be banked. Not only does that data allow us to pin down exact relationships but it also facilitates a quantification of magnitudes. This becomes extremely useful when financial institutions need to consider the impact of targeting blends of customers and attempting to manage portfolio at risk (PAR) levels.

Table 1: Comparison of profiles for excluded and banked respondents.

Excluded	Banked
Rural	Urban
Ages: < 25 and > 45	Age : 25 - 45
Low income	High income
Farming, not owning land	Salaried, pension
Low education level	High education level
Low PPI score	High PPI score
Low Asset score	High Asset Score

It is useful to think of access to finance as a continuum of graduation options, although strictly speaking these are quantised (Figure 2). By using integers ranging from 0 for exclusion to four for banked, it is possible to construct an access to finance index (AFI) which quantifies progress along this graduation pathway.

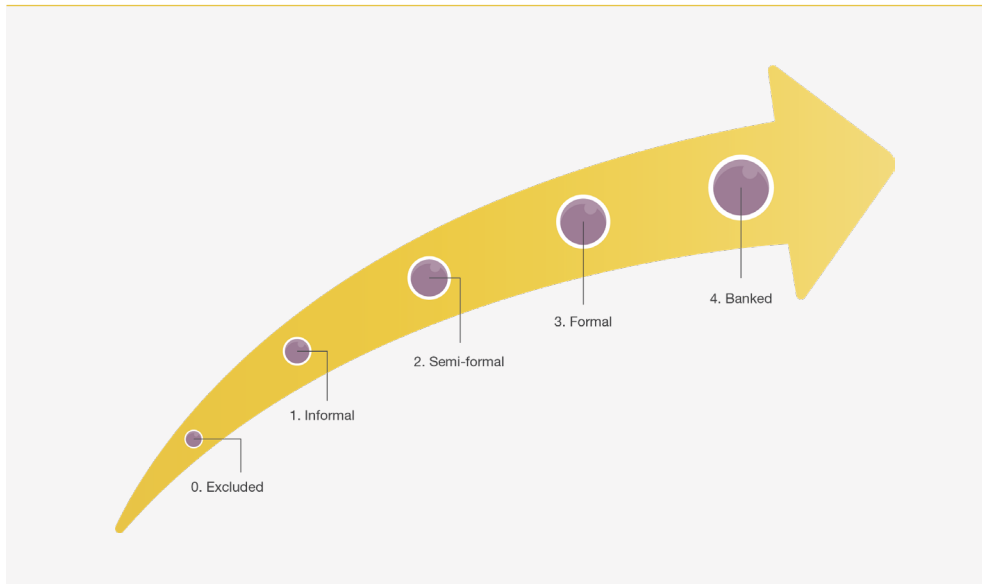


Figure 3: Access to finance index showing the graduation pathway from exclusion to banked.

This in turn facilitates a correlation analysis where a number of different explanatory variables can be evaluated (Figure 4). Education is the single most important positive predictor, with a correlation of 37%, demonstrating that increasing the number of people who have access to education will eventually improve access to finance. Living in a rural area is the most important negative predictor, with a correlation of -16%. A number of other interesting positive drivers were detected suggesting that urban females are the group making most progress. Furthermore landowners who are not farming are also likely to have access to finance.

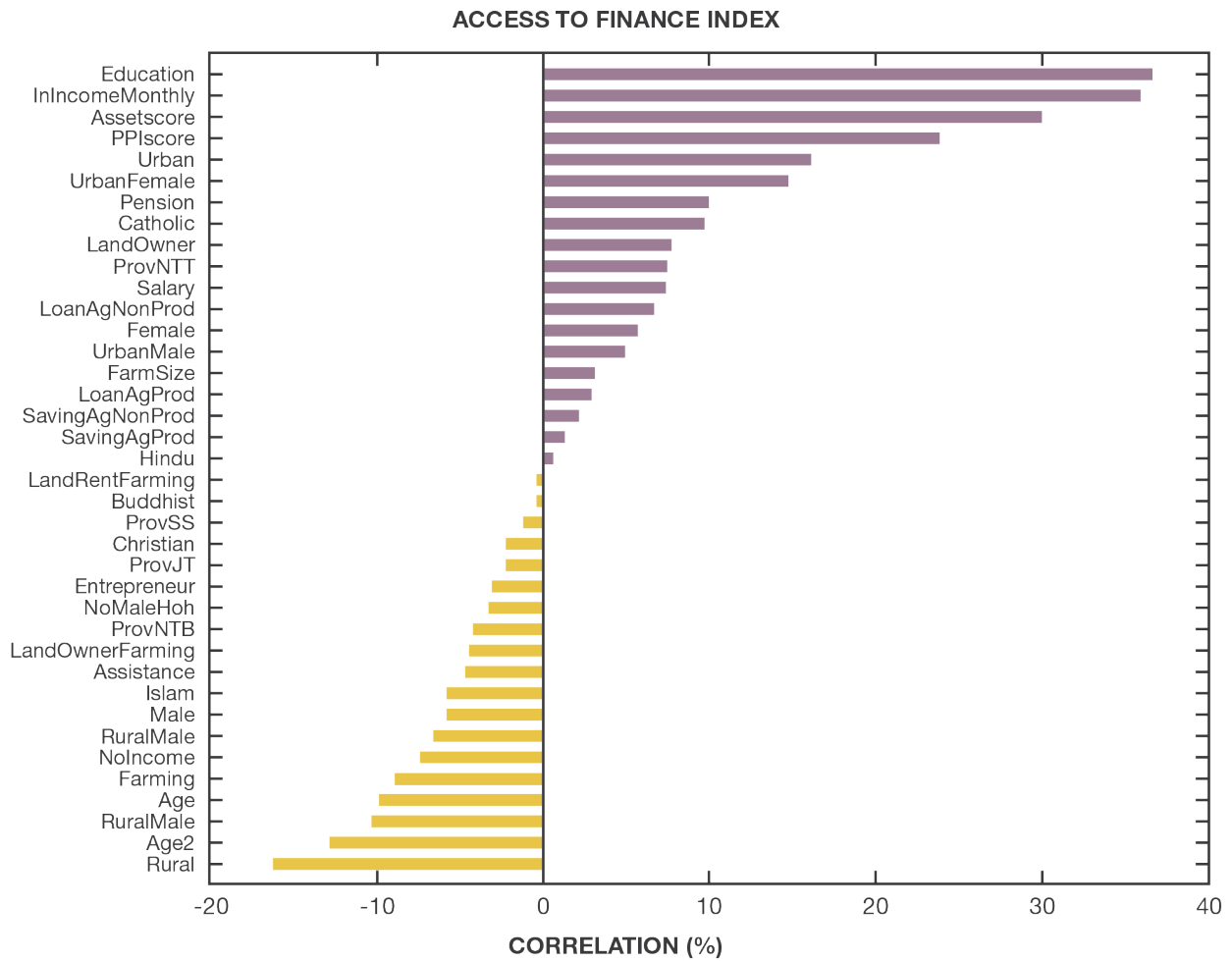


Figure 4: Correlation analysis for access to finance index.

Variable Selection

When attempting to understand the drivers of particular outcomes, it is important to be aware that the cumulative effect of combining different variables may not lead to great improvements in predictability. This is caused by the fact that many of the available variables are strong correlated and hence it may be necessary to select one variable from among a group. This is an important consideration for the scalability of any proposed scorecard for future applications since the choice of variable may be determined primarily by the ease of accessing or measuring such a variable.

By constructing a pairwise correlation matrix using all the available variables, it is possible to define a correlation distance. This distance provides a mean of measuring the similarity between variables and can facilitate the construction of a dendrogram (Figure 5). In particular, the dendrogram highlights a number of issues:

Education, PPIscore and AssetScore are strongly correlated

Farming and rural respondents are correlated

Owning land is more strongly correlated with urban than rural respondents

A stepwise variable selection approach was used to identify variables in each application where a predictive model was constructed. This approach to model construction helps to increase the accuracy of the model for generating predictions and also to ensure that the model is likely to generalise to new situations.

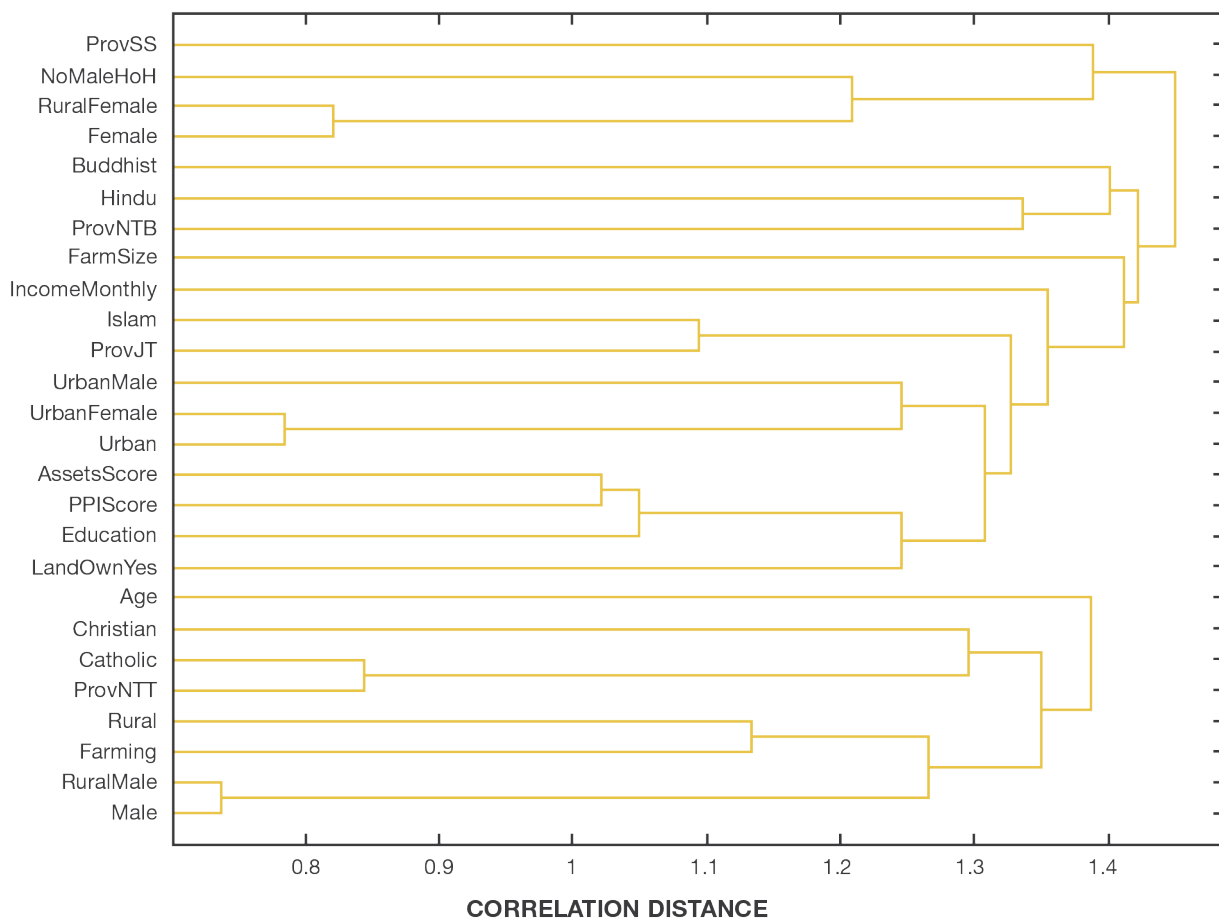


Figure 5: Dendrogram showing the correlation distance between variables.

Financial Services Index

When It was found to be useful to construct an index for the number of financial services being accessed by each respondent. This index then serves as a measure of the actual amount of activity corresponding to each person.

The financial services index is defined as follows:

$$FSI = Savings + Loans + Payments + Insurance,$$

where each components is a binary indicating whether or not the respondent is utilising this particular service. A FSI of zero implies no usage of financial services and a FSI of four indicates high usage of financial services. The FSI does not distinguish between services but rather evaluates the overall usage of the full suite of financial services. The FSI index can then be used to understand the drivers of activity with regard to financial services. The majority of respondents are using two or three of the four financial services. Furthermore, the distribution of FSI is relatively similar across the four provinces (Figure 6).

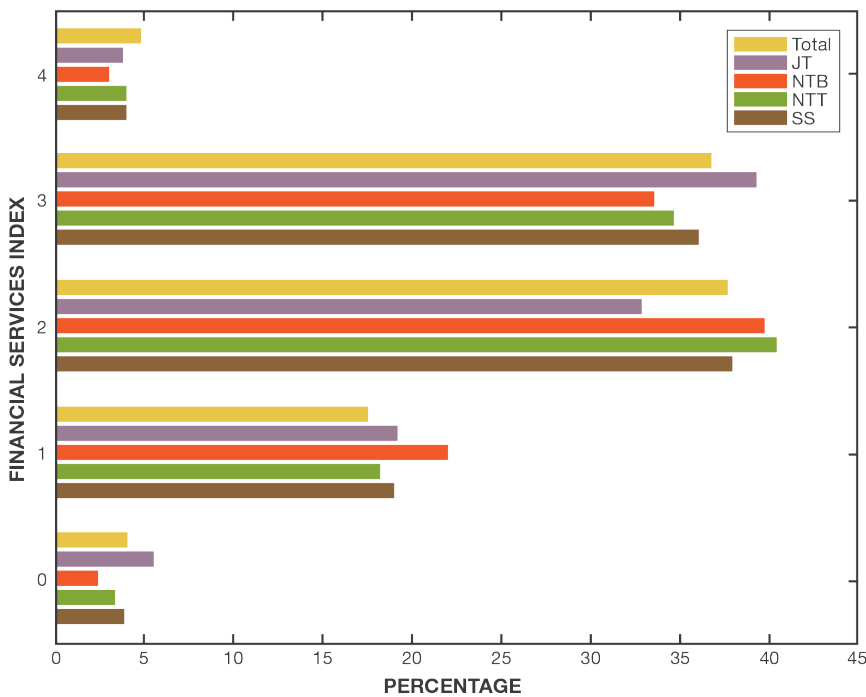


Figure 6: Financial services index (FSI) disaggregated by province.

Financial Literacy Index

An additional index was constructed to assess the level of financial literacy. Due to the particular questions posed by the SOFIA survey, this was restricted to understanding the level of literacy for those that have bank accounts and already accessed credit. Five questions pertaining to bank account services and six to credit and loan information were used to construct a financial literacy index (FLI) that ranged between zero (low financial literacy) and eleven (high financial literacy). Again the index is not concerned with the order of the particular items but rather with the overall level of financial literacy. It is also important to note that a low level of FLI could result from either a lack of comprehension or general education on the part of the respondent or failure of the bank to adequately explain the services or a combination of both. Unfortunately this index is unable to measure the level of literacy that might exist prior to encountering the banking services.

Item	Question	Information
1	How to use an ATM card and ATM machine	Bank Account Services
2	Handling of passwords (for internet banking)	
3	Protecting your PIN	
4	Protecting and not sharing your ATM card with others	
5	Charges for bank services you use	
6	The costs involved, e.g. fees and interest	Credit and Loan Information
7	What you need to pay - your instalment and repayment amount and/or the minimum payment required	
8	An agreement or contract to take home with you	
9	A verbal explanation of your obligations and rights in terms of the agreement	
10	Where or who you could go to if you were unhappy with the contract or had a complaint	
11	What you need to do if you cannot make the repayments?	

Customer Profiles

The correlation analysis was applied to different outcome variables and used to identify the profiles of potential customers that are actively using certain financial services.

Service	Typical Profile
Saving	Savers are typically young urban females who are highly educated, high income with high asset and PPI scores.
Loans	Borrowers are typically young urban males who are highly educated with a high income and high asset score. Unlikely to have loan if female head of household.
Send	Money senders are typically younger urban landowners and entrepreneurs, are highly educated with a high income and high asset and PPI scores. Unlikely to be rural females.
Receive	Money receivers are typically older farming landowners and entrepreneurs with a high income and high asset and PPI scores and often with no male head of household. Unlikely to have no income or be salaried.
Insurance	Insured are typically younger urban salaried, landowners and entrepreneurs, who are highly educated with a high income and high asset and PPI scores.
Health Insurance	Health insured are typically older urban salaried or pensioners (not landowners or entrepreneurs), who are educated with a low income and low asset and PPI scores.

It is also useful to use the correlation analysis to determine the drivers of success as measured by both the FSI and FLI indices. There are many features in common such as the usual set of high income, education, PPI, and Asset. However note that being a land owner who does not farm is also predictive. Urban females achieve high FSI scores and urban males obtain high FLI scores.

Table 3: Profiles of those that scored highly on the FSI and FLI.

FSI

Urban-Female
Younger
High income
Salaried, pension, landowners, entrepreneurs
Land owning but not farming
High education level
High PPI score
High Asset score

FLI

Urban-Males
Younger
High income
Salaried, pension, landowners, entrepreneurs
Land owning but not farming
High education level
High PPI score
High Asset score

Opportunities

The SOFIA database offers considerable potential for both extracting actionable insights and identifying opportunities for the financial institutions that are partnering with SAFIRA. In the following, specific data analysis is combined with ideas proposed by human experts to uncover these opportunities. When possible the size of the market as a percentage of the population and relevant profile details are described.

Opportunity 1.

Follow The Cash

It is important to recognise that while people living in urban and rural areas typically have very different profiles, the rural non-farming community are quite similar to their urban counterparts and may offer an attractive segment for financial institutions to focus on as they pilot new products.

One way to measure the potential for financial services is to analyse the income frequency for those receiving a salary or wages (Figure 7). Income frequency is generally higher in urban than rural areas but this does not mean that there is not potential for reaching new customers. The rural non-farming profile is between urban and rural farming showing potential for financial services.

The data also allows for the analysis of the source and method for receiving income (Figure 8). The percentage of banked respondents is lower in rural areas for all three income sources. Rural non-farming profiles are similar to urban, indicating potential interest in accessing financial services. A recommended approach is to reach out to these salaried people by identifying the companies that employ them and then work towards converting these people to formal banking.

This represents a mechanism for targeting potential customers who are rural, with salary as main income, which is received throughout the year in cash (in hand or claimed at payment point). This particular target group represents 5.3% of the population. The profile is rural land owning farmers, who are typically well educated with high income levels. It is then possible to extend the process to the entire nation by using other data sources if the required variables are available.

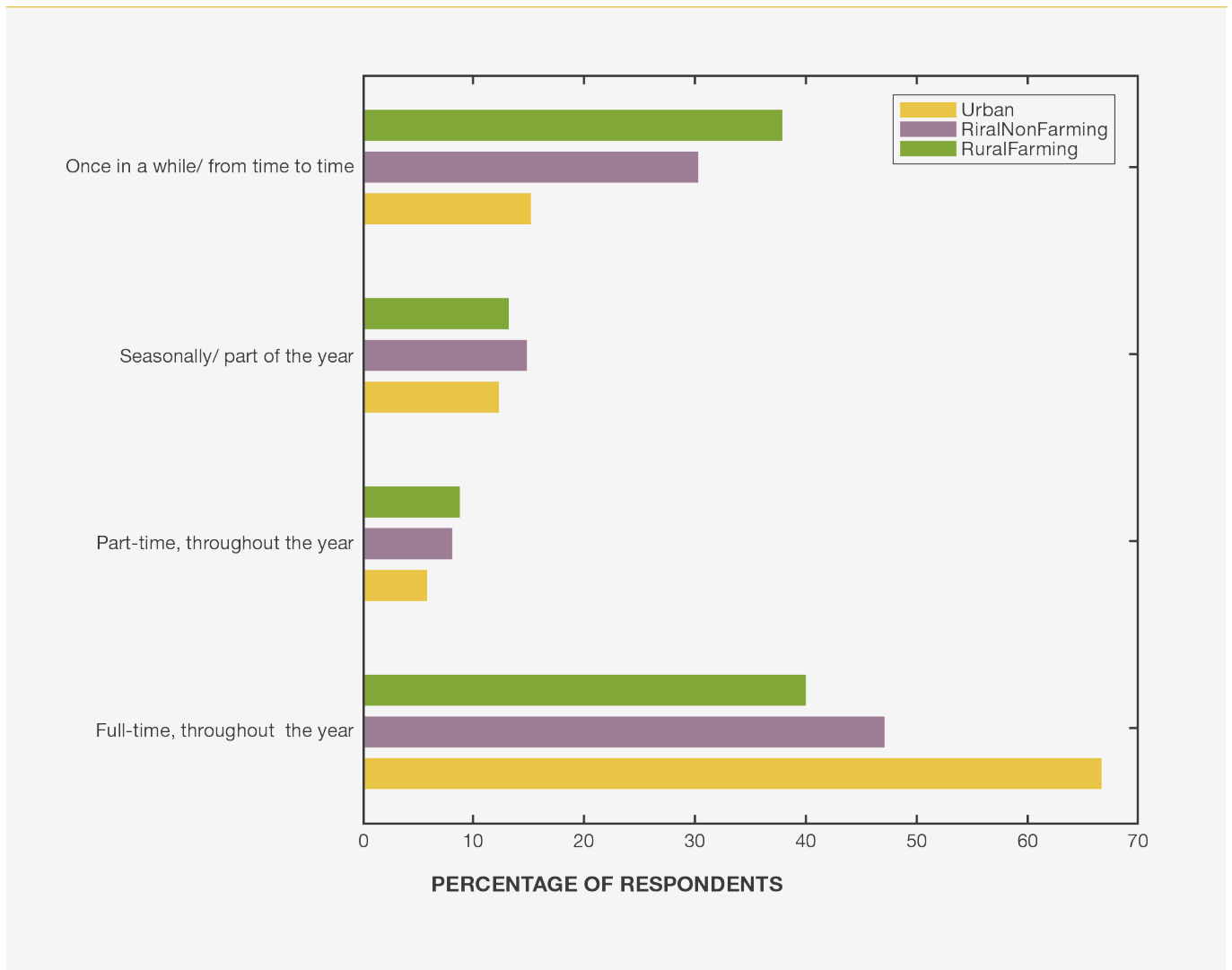


Figure 7: Income frequency for salary and wages disaggregated by urban, rural farming and rural non-farming.

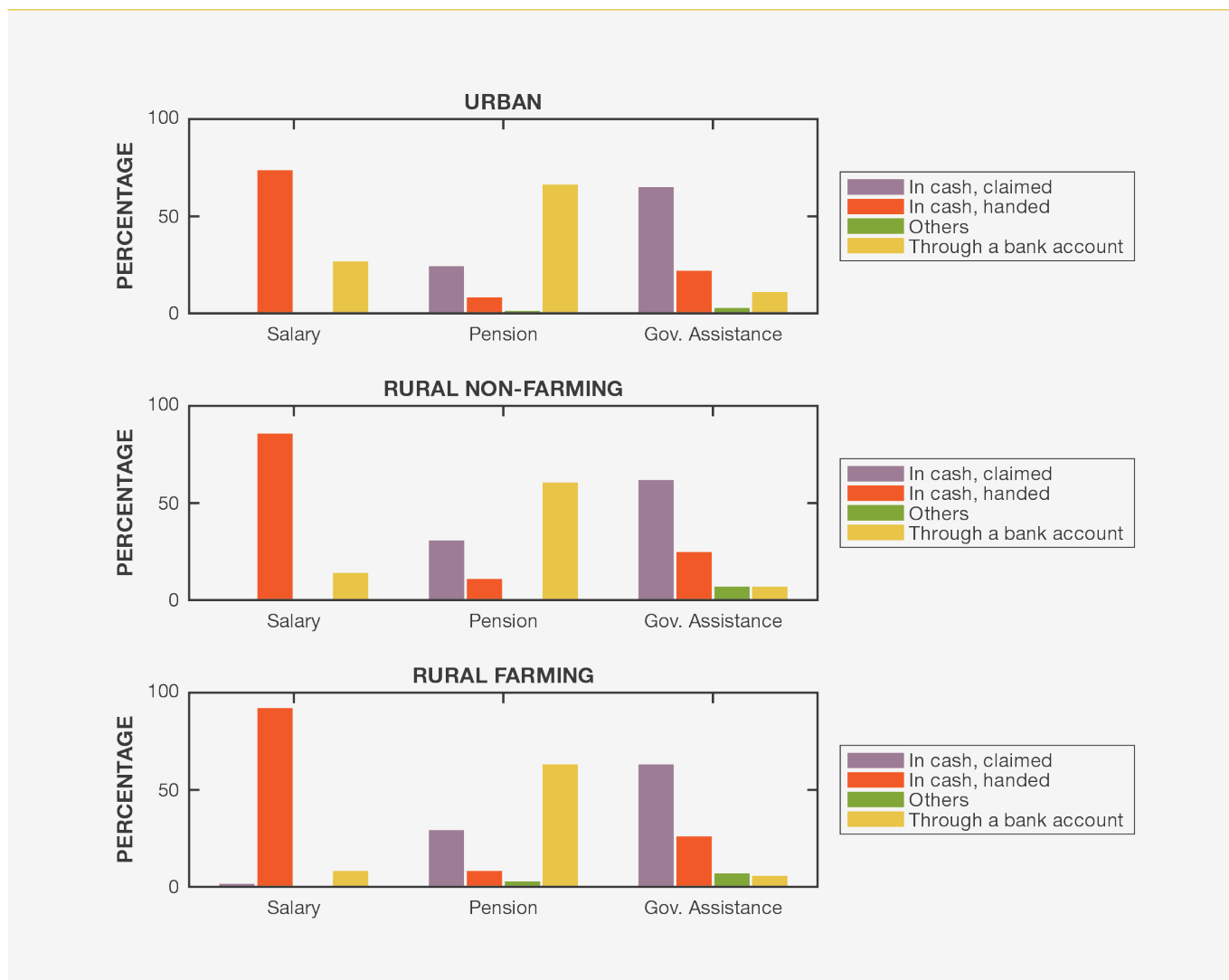


Figure 8: Analysis of source and method of receiving income.

Opportunity 2. Unbanked Senders

The next opportunity arises from investigating those respondents that are sending money. The analysis shows that the province JT (East Java) has the largest percentage of unbanked money senders (20%) and offers the greatest potential for entering this untapped market (Figure 9). This target group, known as “Unbanked senders”, represent 14.6% of the population. The profile of these potential customers are typically rural males, farming and owning large farms, entrepreneurs with low levels of education and PPI score.

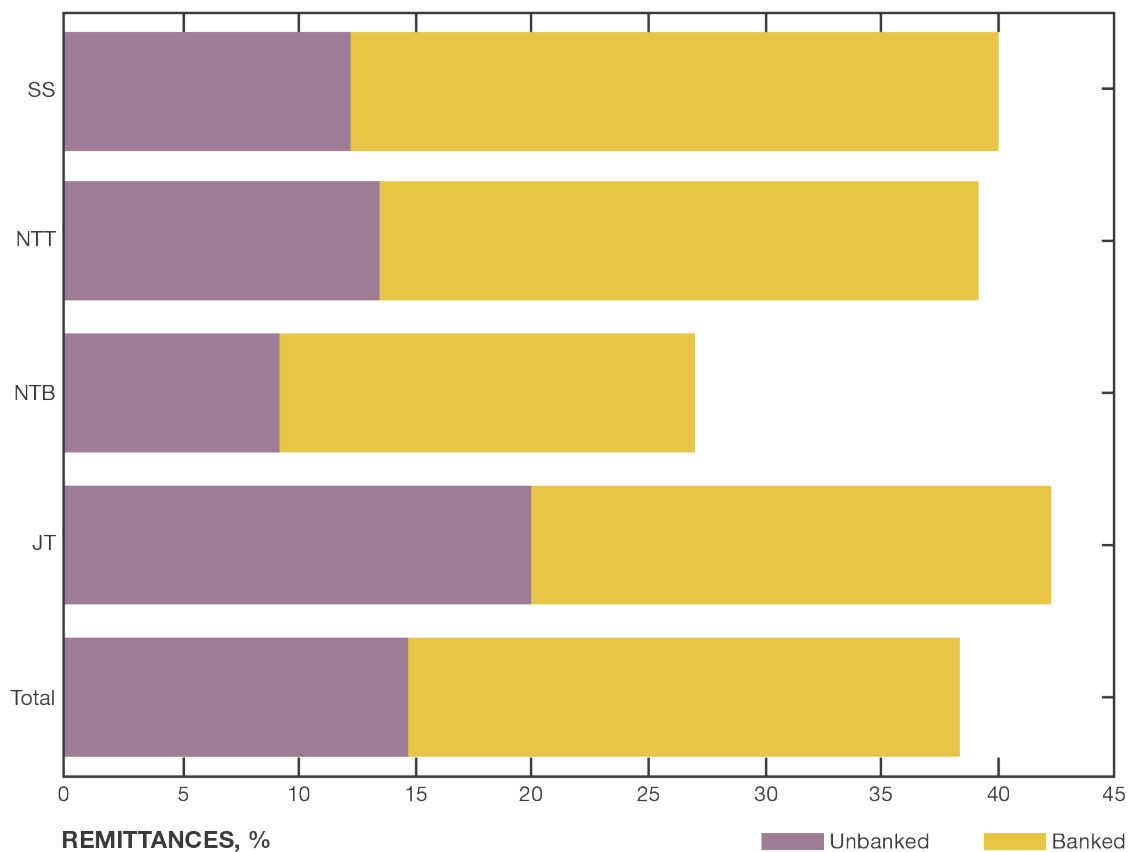


Figure 9: Percentage of respondents that are sending money broken down into unbanked and banked.

Notes:

SS : South Sulawesi

NTT : East Nusa Tenggara

NTB : West Nusa Tenggara

JT : East Java

Opportunity 3.

Transferred Health Risk

The next opportunity arises from the realisation that a substantial number of people living in rural areas have access to health insurance via the government health facility. These people that have health insurance are protected from the adverse effects of shocks caused by the main income earner becoming ill and being unable to keep up with loan repayments. The financial risk associated with such a potential health shock has therefore already been transferred by the government health insurance program. This offers an attractive means of targeting the rural community with loans and a reduced default risk. The recommendation is to target rural people with health insurance who generally represent a lower risk of loan default. This target group represents 32.3% of the population. The profile is the rural farming community both owning and renting land. This segment of the rural community could be cross-referenced with the previous identified districts, which are noted for lacking access to financial services.

Opportunity 4.

Popular Services

The information contained in the SOFIA database offers details about the probability of respondents having access to different financial services. The four services being considered are savings, loans, payments and insurance. The probability of having one or two financial services of financial services is given by the joint probabilities. Loan is most popular (86%) and insurance is least popular (6%). Loan and payment are the most popular pair of services being accessed (58%).

Table 3: Probability of accessing two financial services.

Prob (i&j)	Savings	Loan	Payment	Insurance
Savings	60%	53%	42%	5%
Loan		86%	58%	5%
Payment			66%	5%
Insurance				6%

Opportunity 5.

Cross-Selling

Cross-selling analysis uses the conditional probability to evaluate the potential for selling additional services to customers. This works by exploiting the knowledge that a customer is using one service to determine what service they might also be interested in using. The conditional probability quantifies the likelihood of using a particular service given that a given service is already being used. These probabilities for the four services are given in Table 4.

The substantial overlap in usage of financial services suggests opportunities for cross-selling products. Cross-selling potential was identified for customers with insurance potentially requiring the other three services (save, loan, payment). Customers with one product already are most likely to also want a loan.

Table 4: Conditional probability of each service given that another is being accessed.

Prob (i&j)	Savings	Loan	Payment	Insurance
Savings	100%	88%	71%	8%
Loan	61%	100%	68%	6%
Payment	64%	88%	100%	7%
Insurance	83%	93%	80%	100%

Opportunity 6.

Insufficient Access

The greatest potential of data arises from the construction of mathematical and statistical models that not only capture historical patterns but also have the ability to improve understanding of what is likely to work for new customers and in future situations. This ability of models to generalise to new situations relies on a careful testing of statistical significance it is of great importance to distinguish actual relationships from random patterns that appear by chance. The role of predictive analytics is now investigated for extracting insights at both the individual level and aggregated to the scale of an entire district.

Regression can be used to estimate the AFI for each person using a combination of variables.

A stepwise approach was used to select variables and construct a statistical model for explaining the AFI at the level of the individual. The predicted AFI can also be used to interpret individual respondents or new potential customers. The model accuracy was quantified using a correlation of 51% and achieved a mean absolute error (MAE) of 0.69, which is less than one unit of the quantised AFI, which ranges over the interval [0,4].

The next step is to consider how such a model performs at the district level. The SOFIA dataset comprises a total of $N_d = 92$ districts. Constructing a regression model at this aggregate level for access to finance involved estimating the AFI averaged across the respondents in each district. By aggregating over groups of people, it is usually possible to improve the accuracy of the model and indeed this was the finding. At the district level, the model accuracy achieved had a correlation of 90% and a MAE of 0.09. This represents an almost eight-fold reduction in the MAE by evaluating the approach at the district level.

A comparison between predicted and actual access to finance highlights particular districts with large absolute errors and these may be viewed as outliers (Figure 10). The regression model uses all the available data to make the best attempt at forecasting the access to finance according to the AFI. Any deviations from the predictions offer potentially useful information that might help to target particular districts. A surprise factor is defined to calculate the percentage deviation between the actual and the prediction:

$$\text{Surprise} = (\text{Actual} - \text{Prediction}) / 0.5 * (\text{Actual} + \text{Prediction}).$$

By ranking the surprise factor, it is then possible to draw up a shortlist of districts for further investigation (Table 5). The hypothesis is that districts where the actual AFI is much less than the predicted AFI are ideal candidates for improving access to finance. It is also expected that such districts, currently with less access than expected, may offer the greatest potential for the deployment of additional resources, hopefully leading to greater access to finance in the future. This comes with the caveat that although the SOFIA database is extensive in its coverage of variables to explain access to finance, it does not measure infrastructure or connectivity. It is therefore advisable to further refine the shortlist of districts after checking for other reasons to explain the lack of access to finance.

These districts that have been identified are generally disconnected from economic activity due to their remote locations, usually difficult to reach by road and mobile connectivity. Discussions with SAFIRA staff aged that these districts could be ripe for the introduction of innovative Value Chain Finance (VCF) products. For example, one particular district, SUMENEP, already receives maize input subsidies via the farmer card and might offer potential for VCF. The district ranking could be combined with other indicators to make a final decision about where to pilot new products.

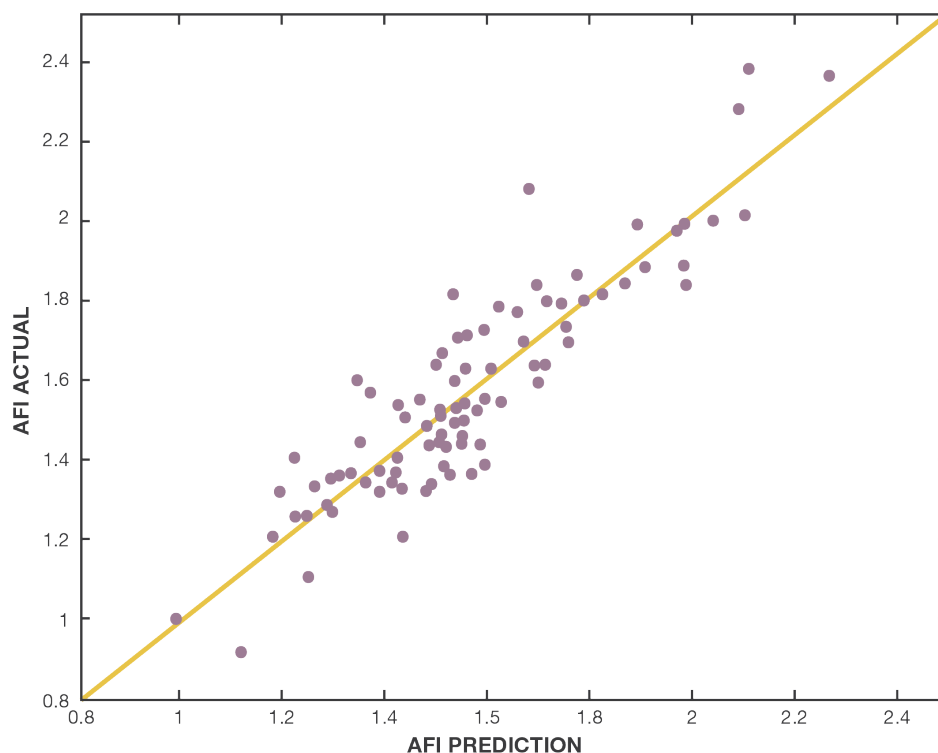


Figure 10: Actual AFI versus predicted AFI for each district.

Table 5: Districts identified as having actual AFI values much less than predicted as measured by the surprise factor.

District	Prov	Rank	Actual	Prediction	Surprise
Bangkalan	JT	1	0.91	1.11	-19.9
Wajo	SS	2	1.20	1.43	-17.9
Nganjuk	JT	3	1.38	1.59	-14.7
Manggarai Timur	NTT	4	1.36	1.57	-14.4
Sumenep	JT	5	1.10	1.24	-12.6
Madiun	JT	6	1.35	1.52	-12.0
Pasuruan	JT	7	1.31	1.48	-11.6
Blitar	JT	8	1.33	1.49	-11.1
Kediri	JT	9	1.42	1.58	-10.5
Bima	NTB	10	1.43	1.58	-10.4

Notes:

SS : South Sulawesi

NTT : East Nusa Tenggara

NTB : West Nusa Tenggara

JT : East Java

Opportunity 7.

MOA Targeting

The selection of appropriate groups to target for improving access to finance should involve a number of considerations. Target customers should have the potential to increase AFI, be financially literate and interested in accessing financial services. A suitability index can be defined and used to identify target customers and districts with large percentages of these target customers. Ideally the design of the suitability index should be an iterative process involving consultation with different FIs and partners.

One approach to thinking about the target groups is to consider the marketing literature around the demand for new products and services. MaInnis et al. (1991) recommend identifying three important drivers of demand: motivation, opportunity and ability (MOA)¹.

The MOA framework provides a useful way to think about targeting potential customers for financial services:

1. Motivation:
Is there a need and demand?
2. Opportunity:
Can financial services help and is there a business case?
3. Ability:
is there sufficient financial literacy?

Financial institutions can provide the necessary infrastructure and personnel that might facilitate access to services but they first need to be confident that there already exists motivation, opportunity and ability. It is possible to employ the SOFIA dataset to analyse each one of these in turn.

Motivation can be measured using the SOFIA dataset to evaluate demand for services (FSI). Opportunity can be predicted and inferred from different studies (e.g. commercial value of increased female participation). Ability is reflected in financial literacy and can be measured using the SOFIA data (FLI).

This MOA targeting approach is demonstrated by analyzing the intersection of the FSI and FLI at the district level. The aim is to identify districts where there is insufficient demand given the level of financial literacy. The first step is to use the financial literacy to predict the financial services. This is achieved using a simple linear regression model:

$$FSI^{\wedge} = a + b * FLI,$$

where FSI^{\wedge} is the prediction of FSI.

The correlation between FLI and FSI is 35% and it is expected that financial services and financial literacy will increase in parallel. Again it is the outliers that are particularly interesting as these districts require special attention. The second step is to focus on large negative errors where the actual financial services index is lower than predicted according to the model. By ranking districts by the surprise factor, it is possible to prioritise interventions. As a third step, for example, it would be possible to identify females in these districts and offer gender sensitive financial services.

¹MaInnis, Moorman, Jaworski (1991). Enhancing and measuring consumers' motivation, opportunity, and ability to process brand information from ads. Journal of Marketing 55: 32-53.

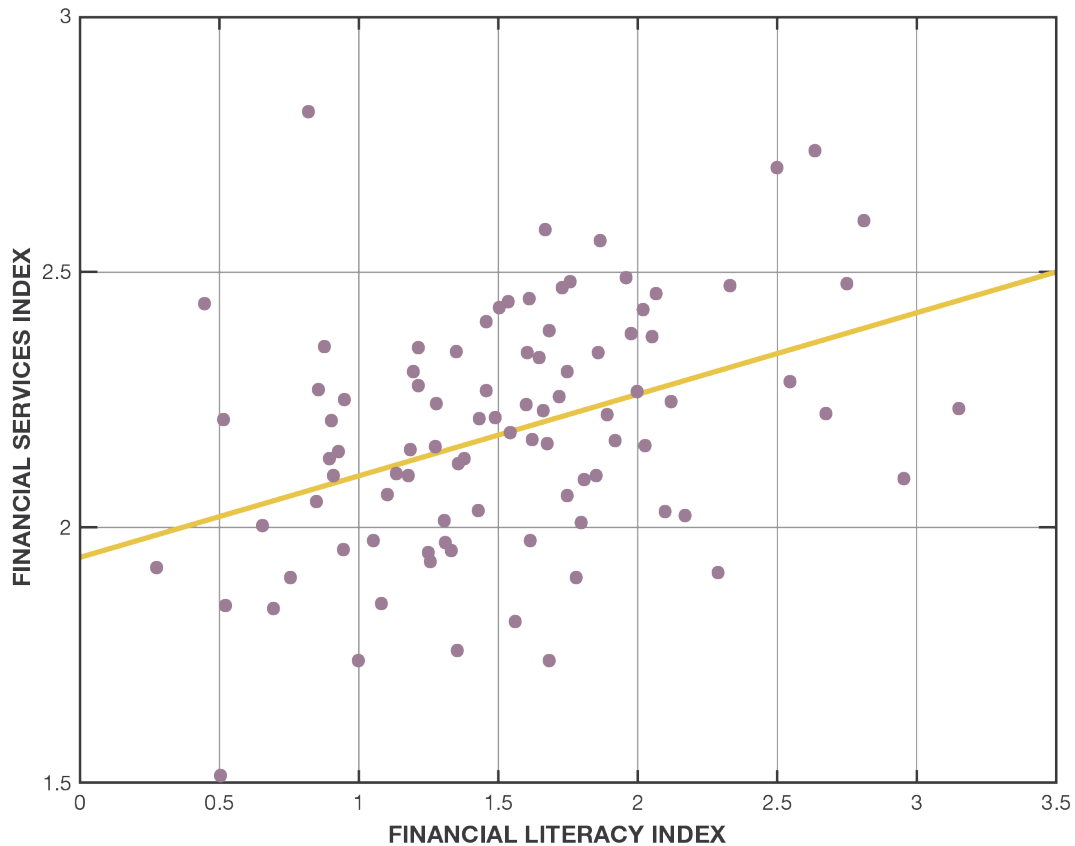


Figure 11: Financial services index (FSI) versus financial literacy index (FLI).
The yellow line shows the fit obtained using the linear regression model.

Table 8: Districts identified where actual FSI is less than predicted.

Prob (i&j)	Prov	Rank	Actual	Prediction	Surprise
Sabu Rajjua	1	1.5	2.0	0.5	-29.2%
Madiun	2	1.7	2.2	1.7	-23.8%
Situbondo	3	1.8	2.2	1.3	-20.5%
Probolinggo	4	1.7	2.1	1.0	-18.9%
Ngawi	5	1.8	2.2	1.6	-18.8%
Barru	6	1.9	2.3	2.3	-18.6%
Wajo	7	1.9	2.2	1.8	-15.9%
Luwu Timur	8	2.1	2.4	3.0	-14.2%
Sumba Timur	9	1.9	2.1	1.1	-13.4%
Maros	10	2.0	2.3	2.2	-12.4%

Gender and financial services



An examination of the different financial services highlights some areas where females are both leading and lagging behind their male counterparts. This provides motivation for creating new products and services that are not only appealing for women but also address specific challenges that they need to address. A comprehensive study of the attractive proposition that females offer financial institutions in terms of financial services has also been commissioned by SAFIRA².

The findings where dramatic differences were found by gender include the following:

Young males (< 45) are more likely to be financially excluded.

Females are more likely to save and have health insurance.

Females are less likely to borrow, send & receive money and have insurance.

For usage of financial services as a whole (FSI), urban females are the best adopters.

For financial literacy (FLI), urban females do not achieve scores as high as urban males.

It is useful to highlight the differences not only by gender but also by location, considering whether respondents are urban or rural. It was found that on the whole, the urban/rural divide is much greater than the gender divide. Seven metrics were considered, including access to finance status (banked, excluded) and five financial services (savings, loans, payments, insurance and health insurance). Urban males outperform the other groups on four of the seven metrics. Urban females outperform on three of the seven metrics.

An extended analysis of the access to finance status and utilization of different services is also provided (Table 8). Again, it is clear that people in urban settings are performing best across all these metrics. The exception is rural males who are most likely to use payment services for receiving money. There is a substantial amount of variation in the usage of services by province but no dominant under or over performing province.

²SAFIRA (2018). Commercial Opportunities to Expand Financial Services: Women.

Table 7: Comparison of the percentages of respondents broken down by location and gender.

Metric	Urban Male	Urban Female	Rural Male	Rural Female
Banked	58.2	52.5	39.0	37.9
Excluded	13.1	9.6	19.0	17.0
Saving	60.7	72.3	49.0	60.6
Loan	88.9	84.4	86.3	84.6
Transfer	71.0	69.0	66.2	62.9
Insurance	13.1	8.8	4.2	2.8
Health Insurance	50.9	51.0	48.5	50.1

Table 8: Performance ranking of different provinces, location and gender for different outcomes.

Metric	Urban Male	Urban Female	Rural Male	Rural Female
Excluded	JT	NTT	RurMal	UrbFem
Banked	AFI	AFI	ADI	RurFem
AFI	NTT	NTB	UrbFem	RurMal
Saving	NTT	JT	UrbFem	RurMal
Loans	NTB	SS	UrbMal	RurFem
Send	JT	NTB	UrbMal	RurFem
Receive	SS	NTT	UrbMal	RurFem
Insurance	JT	NTB	UrbMal	RurFem
Health In.	NTT	JT	UrbFem	RurMal
FSI	SS	NTB	UrbFem	RurMal
FLI	SS	NTT	UrbMal	RurFem

Notes:

UrbMal : Urban Male

UrbFem : Urban Female

SS : South Sulawesi

NTT : East Nusa Tenggara

RurMal : Rural Male

RurFem : Rural Female

NTB : West Nusa Tenggara

JT : East Java

Agricultural finance

SAFIRA is particularly interested in improving access to finance for rural agricultural communities. A number of findings came to light with regard to this segment of society:

1. Financial services are being used for savings and loans relating to both agricultural productivity and non-productivity.
2. Farmers rarely use the full set of financial services.
3. Farmers are more likely to receive than send money using payment services.
4. There is a concerning lack of insurance for farmers (both those that rent and own land).

The three target groups that have been identified, “Follow the Cash”, “Transferred Health Risk” and “Unbanked Senders” would all serve to increase access to finance for rural communities. It is recommended to explore how existing relationships could be used to support the creation of innovative value chain finance (VCF) products. For example, one particular district, SUMENEP, already receives maize input subsidies via the farmer card and this might offer potential for piloting new VCF products.

Conclusions

The SOFIA dataset is an important asset for better understanding the complex human behaviour and interactions that give rise to the consumption of financial services. Almost twenty thousand respondents across four provinces in Indonesia were surveyed. Four distinct types of financial services were considered: savings, loans, payments and insurance. Analysis of the data offers insights that can now be generalised to all of Indonesia.

A correlation analysis was used to develop customer profiles for identifying the factors that determine outcomes for different people. It was found that the location of the respondent (urban versus rural) was a stronger determinant of outcome than gender (female versus male). Profiles help to segment customers and offer a means of targeting certain groups with the intention of offering innovative financial services that will be attractive and also offer benefits for the intended audience.

Models were constructed to explain different outcomes using a stepwise approach to selecting explanatory variables. Deviations between actual outcomes and model predictions can be viewed as a valuable source of information. A ranking approach was used to help identify potential opportunities at a district level.

An iterative approach was employed to combine the results of the data analytics with feedback from human experts. This consultative approach facilitated progression from ideas to actionable insights. Seven opportunities have been identified and offered as recommended next steps to improve access to finance for rural agricultural communities.

The study has identified a total of seven opportunities for the financial institutions:

1. Districts that have less access to finance than expected from predictions suggest resources can have the greatest chance of impact

2. Target “Follow the Cash”: unbanked people currently receiving their salary as cash on a frequent basis

3. Target “Transferred Health Risk”: rural people with government-funded health insurance are a relatively low-risk

4. Target “Unbanked Senders”: potential for formal payment services and other products

5. Start by offering the most popular service, loans, and then consider payment services

6. Utilise cross-selling to increase access to finance

7. Districts that have insufficient demand for services given their financial literacy are a source of potential customers

It is recommended that the SAFIRA partners consider each of the seven opportunities in connection with their own priorities and appetite for rolling out new products. Implementing solutions based on these insights would require a deeper dive into the SOFIA data and analysis of related data that could be accessed from national statistics. Furthermore, there is considerable potential from combining the SOFIA database with proprietary data that each partner has as an internal source relating to its existing customers. This data would enable an evaluation not only of the potential market size in specific districts but also of the profitability and risk associated with each of the identified target groups.

