Bridging the Gap:  
The Role of Data in Deepening Smallholder Farmer Financing
Colophon

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Table of Contents

EXECUTIVE SUMMARY ......................................................................................................................... 3

1. THE STATE OF AGRICULTURAL FINANCE IN KENYA ........................................................................ 4

2. FINTECH DEVELOPMENTS THAT IMPROVE THE DELIVERY OF FINANCIAL SERVICES TO RURAL AREAS ................................................................. 5

3. CONVERGENCE OF CREDIT AND DATA ............................................................................................... 7

4. ADDITIONAL CHALLENGES TO FINANCIAL INSTITUTIONS INCORPORATING FARM MANAGEMENT SYSTEMS .................................................. 16

CONCLUSION AND RECOMMENDATIONS ............................................................................................ 20

ANNEXES ................................................................................................................................................... 22

Table of Figures

TABLE 1: LEADING MOBILE CREDIT PRODUCTS OFFERED BY BANKS IN KENYA. 5
TABLE 2: MINIMUM DATA REQUIRED BY FINANCIAL INSTITUTION FOR CREDIT UNDERWRITING 8
TABLE 3: KEY BENCHMARK FOR CREDIT UNDERWRITING FOR FINANCIAL INSTITUTIONS 8
TABLE 4: INDIVIDUAL ASSESSMENT OF FARM MANAGEMENT SYSTEMS IN KENYA 10
TABLE 5: INDIVIDUAL ASSESSMENT OF FARM MANAGEMENT SYSTEMS IN KENYA 13
TABLE 6: THE ABILITY OF FARM MANAGEMENT SYSTEM TO MEET THE DATA WISH LISTS OF FINANCIAL INSTITUTIONS. 14
TABLE 7: DATA OWNERSHIP RIGHTS AS REPORTED BY FMS PROVIDERS 19
Executive Summary

Despite accounting for over 70% of the country’s agricultural production, smallholder farmers in Kenya face a massive financing gap that prevents them from making investments in day-to-day farming operations, as well as in the types of agricultural equipment and infrastructure needed to increase productivity and income. Financial institutions are reluctant to finance smallholders due to four factors, which partly are the result of data limitations:

1) Lack of credible and verifiable data on smallholders that could support agriculture lending decisions
2) Smallholders lack collateral that could secure their loans
3) High transaction costs of reaching remote rural populations
4) Smallholders are considered high-risk customers because of the nature of the agricultural risks, i.e., production and price risks—they are exposed to.

Because of these data gaps, most smallholders lack financial profiles, which makes it prohibitively costly for financial institutions to make underwriting decisions whereas those that do have financial profiles largely remain invisible to lenders. Fintech innovations have improved several financial inclusion indicators in Kenya, and helped reduce many of the transaction costs of reaching rural populations. However, the challenge to financing smallholders remains risk evaluation: in other words, access to adequate data on risk. With access to broad and reliable data on smallholder farmers, financial institutions could address most the above challenges that currently constrain credit flows to smallholders.

Providers of Farm Management Systems (FMS) are well-positioned to fill this data gap, as they already collect data on farmers and farmer organizations. Depending on the organization, FMS providers use that data for internal purposes or market it to third parties, such as financial institutions, off-takers, or input suppliers. As such, FMS companies have the potential to play a catalytic role in increasing financial inclusion for farmers. This report examines how the data currently collected by FMS providers in Kenya corresponds to the data requirements and needs of financial institutions when underwriting agricultural credit. Based on interviews, as well as surveys, with financial institutions and Farm Management Systems providers, the report also seeks to highlight the key issues that FMS providers need to address to effectively bridge the data gap between financial institutions and smallholders.

The report identifies four key areas where, by tailoring their data offering to the data needs of financial institutions, FMS providers can help financial institutions unlock lending to smallholders in Kenya. FMS providers should seek to:

1) Better align their data offering to the data needs of financial institutions, with a focus on data points that deliver the most predictive power for lenders in relation to farmers’ financial behavior and this should include know-your-customer data, transactional data and farm level enterprise performance data.
2) Improve the reliability and integrity of existing data they collect.
3) Provide robust and flexible options of systems integration. FMS providers need to understand how, when, and in what format financial institutions need data on farmers, and then package their solutions accordingly.
4) Ensure providers and users have adequate assurance around data privacy, protection, and access.

By working closely with financial institutions interested in financing the agricultural sector and smallholders, FMS providers can further develop their systems to address these four challenges. Closer and ongoing partnerships will, therefore, be critical to uncovering the true value of the big data capabilities of Farm Management Systems. Governments, development agencies and finance institutions, along with foundations, can accelerate this collaboration by facilitating pilot projects between financial institutions and Farm Management Systems.
1. The State of Agricultural Finance in Kenya

The agricultural sector is the backbone of the Kenyan economy. It accounts for over 50% of export earnings and approximately 30% of GDP while providing jobs and livelihoods to over 80% of the population. Smallholder farmers still account for the bulk of production in Kenya, with over 70% of most crop and livestock production being delivered by this subgroup of producers.

Even with mixed economic outcomes over the past several years\(^1\), agriculture has continued to outperform other sectors, including manufacturing, with export-oriented sub-sectors such as horticulture, floriculture, tea, and coffee being the greatest source of growth. Despite the importance of agriculture to the Kenyan economy, rates of investment across the sector remain dismal. Smallholders, however, bear the greatest brunt of this financing gap.

Although many commercial and microfinance institutions in Kenya boast of having established agribusiness units or departments, the share of agriculture finance as a percentage of outstanding national credit remains below 5 percent, has shown little signs of improvement.\(^2\) The investment and input financing needs of many smallholder farmers remain unmet by financial institutions. Smallholder farmers in Kenya site lack of capital and access to affordable credit as the main factors behind the low productivity in agriculture.\(^3\)

This financing gap impedes the country’s efforts to: become food secure; improve the lives of those, such as farmers, who depend on the sector for their livelihoods; and spur the growth of the rural, and in turn, the national economy.

The key barriers that limit financing for smallholder farmers are:

1) Lack of credible and verifiable data on smallholder farmers that could support agriculture lending decisions and this includes both data on transactional income from their farms as well as on the overall performance of their farm.
2) Smallholders’ lack of collateral that could secure their loans.
3) High transaction costs of reaching remote rural populations
4) Smallholders are considered high-risk customers because of the nature of the agricultural risks, i.e., production and price risks, they are exposed to.

\(^1\) The sector grew by 5.2% in 2013, 3.5% in 2014 and 5.6% in 2015 respectively.
\(^2\) The Central Bank of Kenya’s Annual Bank Supervision Report for 2015 found that agriculture accounted for a paltry 4.04 percent of the gross loans issued by banks as compared to manufacturing at 12.30 percent, Personal/Household loans at 25.45% with trade standing at 19.56 percent.
\(^3\) Kamara, Adekele, Zuzama 2010.
2. Fintech Developments That Improve the Delivery of Financial Services to Rural Areas

The growth of fintech companies has transformed Kenya’s financial landscape over the last several years, leading to the entry of different players and deployment of varied solutions to the financial inclusion space. The Consultative Group to Assist the Poor (CGAP) has termed the arrival of fintech into the financial inclusion space as “digital financial inclusion”, and has identified three key components to these models:

1) Digital Transactional Platforms
2) Retail Banking Agents
3) Customer Access to Mobile Devices

The development of fintech in Kenya, which has been a pioneer in the space, has been largely linked to the penetration of mobile services across the country. MPesa provides the platform on which most of the existing solutions are built, and its mobile payment, savings and lending solution are the most well-known example of fintech in Kenya. Other prominent fintech companies in the Kenyan market include Kopo Kopo, MKopa, InVenture (now TALA), BitPesa and Musoni et al, which target various sectors, from retail and microfinance to energy.

The MPesa payment platform and other mobile payment solutions have become so entrenched into the daily lives of Kenyans that the government now considers them as potential fiscal risk.

The banking sector has also adopted fintech delivery models. Equity Bank, for example, has built a digital platform that includes mobile, card and agency banking. The bank has built a national network of over 25,000 agents who now mobilize 20 percent of the bank’s total deposits. As of October 2015, Equity Bank reported that it had processed 74% of the loans disbursed in 2015 through its mobile phone platform Equitel. Other banks have not been left behind with players such as Commercial Bank of Africa, KCB Bank, Co-operative Bank of Kenya as well as several microfinance institutions and SACCOs rolling out their own mobile based deposit and loan products. The table below provides data on the reach of prominent mobile banking products and services in Kenya.

<table>
<thead>
<tr>
<th>Product</th>
<th>Organization</th>
<th>No. of customers</th>
<th>Provides a Loan Solution?</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-Shwari</td>
<td>Commercial Bank of Kenya (CBA) and Safaricom</td>
<td>7.1 Million by 2015</td>
<td>Yes</td>
</tr>
<tr>
<td>KCB Mpesa</td>
<td>Kenya Commercial Bank (KCB) and Safaricom</td>
<td>2.7 Million by 2015</td>
<td>Yes</td>
</tr>
<tr>
<td>MCo-op Cash</td>
<td>Co-operative Bank of Kenya</td>
<td>1.3 Million by 2015</td>
<td>Yes</td>
</tr>
<tr>
<td>Equitel</td>
<td>Equity Bank of Kenya</td>
<td>1.1 Million by 2015</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: Author of the Report

The proliferation of fintech services has resulted in dramatic increases in the integration of many Kenyans into the formal financial system. In 2006, only 15% of Kenyans had an account with a formal financial institution; over 30% of adults were using informal financial services; and more than 40% of adults were entirely excluded from any form of financial services. Fast forward to 2015, and because of the development of mobile money, 71% of adults were

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4 Digital Financial Inclusion: Implication for Customers, Regulators, Supervisors, and Standard Setting Bodies
using mobile money services. The rate at which bank accounts are opened has also increased rapidly, with 30% of adults now having bank accounts in formal financial institutions.

With at least 80% of Kenyans having access to a mobile phone and 55% with access to the Internet, the use of digitally driven financial services is expected to grow, and at an accelerated pace as Kenya’s young population expands and acquires more disposable income. This age group is digitally savvy, demands quick and seamless service, and thus, will provide a fertile ground for providers of digital financial services.

So far, clients have used mobile banking principally to facilitate payments. Where lending has occurred, it has consisted principally of retail and microloans, mostly to non-agricultural enterprises or for non-agriculture related economic activities with leading mobile lending solutions such as KCB Mpesa and M-Shwari largely using alternative data (call records) to score borrowers. Agency banking, supported by robust payment and financial service solutions, has the potential to help expand the reach of financial services, including loans, to rural communities and farmers. Infrastructure challenges and the high costs of setting up and maintaining branches in rural areas will continue to limit the physical expansion of financial services there, and in turn, make mobile banking solutions attractive.

However, financial institutions still need more and better data on farmers before they can invest heavily in extending such solutions to them. There is, consequently, an opportunity to explore how mobile banking solutions can be leveraged to enable the use of data provided by Farm Management Systems to enhance lending decisions but also to deploy and collect loan funds.
3. Convergence of Credit and Data

Farm Management Systems and The Data Requirements of Financial Institutions

As fintech companies and solutions reduce many of the transaction costs involved in reaching rural populations, the principal challenge to financing smallholders becomes risk evaluation. With access to improved data on smallholder farmers, financial institutions could address the principal challenges—outlined in the Executive Summary—that currently constrain credit flows to smallholders. High-quality, reliable data sets on factors like productivity, prices, and weather could enable financial institutions to better assess the risk of financing farmers and the conditions in which they operate. This, in turn, would allow them to make better-informed decisions on whether to lend and, if so, how to price the attendant risks.

As the risk profiles of smallholders become clearer and more complete, financial institutions might also be able to reduce collateral requirements on farmer loans. Additionally, they will be able to leverage technologies, such as automated credit scoring tools, and alternative delivery challenges to further bring down the transaction costs of reaching rural areas.

Farm Management Systems can play a key role in filling this data gap for financial institutions. In Kenya, FMS providers tend to be startups, but there is still some variety. Some are long-established FMS providers that have been in the market for between 5 – 15 years while others are at the emerging stage with backing from donors and impact investors. One of unique case is that of an FMS that grew out of a grew out of a horticultural export company that had worked with out grower schemes and had used the system internally for managing farmers’ records, issuing, and managing loans to farmers etc. before deciding to offer the solution to the market.

The core clients of FMS providers are financial institutions, off-takers, and input companies, who use their data to help understand or manage risks along supply chains. However, as this study focuses largely on the opportunity that FMS represent for expanding financial inclusion, the focus is on financial institutions.

This study uncovered critical aspects about existing Farm Management Systems that need to be addressed and improved for banks to fully embrace the use of data from the systems to support their lending to farmers:

The Data Needs of Financial Institutions for Credit Decisions

To understand the current state of data on smallholder farmers in Kenya and the data needs of financial institutions, researchers conducted a series of interviews and surveys with representatives of seven financial institutions and five Farm Management Systems providers operating in Kenya. The interviews and surveys focused on two questions:

1) What data points do financial institutions in Kenya require for underwriting decisions on smallholder farmers?

2) What data points on farmers are Farm Management Systems currently able to provide? And to what extent are they able to deliver that data in accordance with the needs of financial institutions?

The table below lays out the minimum data points that the seven participating financial institutions require to make credit decisions.
In addition to these minimum data categories, participating financial institutions were asked, in a survey, to rank the potential importance of 7 additional data categories for credit decision-making processes for the agricultural sector. This survey aimed to establish what data points were considered the most important by Financial Institutions in supporting lending decisions. Additionally, this was aimed at establishing a potential “data wish list” for financial institutions, and to then evaluate the degree to which FMS providers currently collect and update the data points on the wish list. The data categories selected by the research team overlap with the guidelines established by the Food and Agriculture Organization (FAO) on an ideal farmers’ management system. Per the FAO, such systems should provide regularly updated reports with the following data categories:

(i) Productivity data (yields per unit of land or animal, along with the value of output per unit cost)
(ii) Profitability (gross margin for activities)
(iii) Diversity of activities and products at the farm level.
(iv) Flexibility of a single product or of all farming system’s products and
(v) Sustainability of the farming system over a given period

Table 3: Key Benchmark for Credit Underwriting for Financial Institutions

<table>
<thead>
<tr>
<th>Credit Information Benchmark for Financial Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity Information (Yields etc)</td>
</tr>
<tr>
<td>Good Agricultural Practices (Inputs, Crop...</td>
</tr>
<tr>
<td>Market Information (Input Prices, Output...</td>
</tr>
<tr>
<td>Information on Weather and Diseases</td>
</tr>
<tr>
<td>Agricultural Services Information...</td>
</tr>
<tr>
<td>Farm Infrastructure (Storage Capacity, ...</td>
</tr>
<tr>
<td>Capacity Needs of the Farmer</td>
</tr>
</tbody>
</table>

Ranking: 5- Very Important, 4- Important, 3- Indifferent, 2- Not important, 1- Not Important at All
The survey results clearly demonstrate that financial institutions consider most of the 7 data categories to be important for underwriting decisions. The analysis shows that financial institutions consider data points around the production and access to market aspects of the farmers as critical for supporting lending decisions hence pointing to their need to better understand and price the risks associated with production and marketing of agricultural produce.

The nature of the data expressed as important and above demonstrates a need by financial institutions to get a more comprehensive overview of the farmer’s enterprise and in a form, that is easily accessible and updated frequently. The lenders indicated that they don’t have capacity to collect and continuously update data on farmers and hence would be keen on partnering with FMS providers that provide reliable data on farmers to support their lending activities with the preferred engagement model being to pay as the services are rendered by the FMS providers.

Although participating banks indicated that they would not use all the data points in table 3 when making credit decisions, they reported that they would weigh it, along with other internally generated data and determine what is critical at every point and for each farmer to support their decision making. Data on these indicators would also provide banks with greater insight into what they are financing and conditions that could have an impact on the ability of farmers to repay their loans.

Having said that however, it is our view that financial institutions need to determine the most critical data points needed to support credit scoring to enable FMS providers to focus their limited resources in ensuring that they provide the lenders with as accurate and consistent data to support their lending activities. These data points can be determined over time as lenders work closely with FMS providers and develop a better understanding of which data points provide them with the best predictive capability on farmers’ payment behavior. Our assessment is that as lenders continually use reliable data to support their lending and as the data becomes more predictive, they will naturally develop greater acceptance to the services provided by FMS providers.

The Data Capabilities of Farm Management Systems

The Farm Management Systems reviewed for this report varied in terms of the number of profiles of farmers captured in their systems. They also seemed to prioritize data on farmers from different value chains and this is largely due to their origins and areas of operations with the predominant value chains being dairy, tea, horticulture, and cereals. The number of farmer profiles captured in each system ranged from a high of 400,000 for FMS Provider 5 to a lowest of 30,000.

The data collected by these FMS providers is largely focused on individual farmers’ personal details and transactional data. This includes national identity numbers, mobile numbers, as well as several types of transactional data, such as: the quantity of agricultural production supplied, quality indicators of that production, and details on the farmer’s aggregator or off-taker.

Table 4a below (data collected) shows significant alignment between the minimum data (Table 2 above) required by financial institutions for credit decisions and the data captured by FMS providers. The FMS Provider 1 and FMS Provider 4 systems scored highly based on the above ranking. The two systems had farmer profiles with more data points hence capturing

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7 300,000 are from the tea value chain with the rest in cereals, horticulture and dairy.
8 Managed by a dairy farmer’s apex body.
most if not all the basic data points required by financial institutions to support lending. This may well be because they are the only systems that the researchers managed to physically verify their capability. The rest of the providers either did not accept to provide a live demonstration or provide a print out of the data they capture hence limiting the extent of the assessment to self-reported assessment using the above table.

However, despite the two systems above being having more data, FMS Provider 4, lacked financial data on farm operations. The system only provides data on the quantity of production that farmers supply to off-takers and the payment they receive from their off-takers. These two data points, alone, cannot provide a complete view of a farmer’s financial position, but can still be used to determine decisions on payments against farmer’s receivables. However, a much complete view incorporating all the economic activities of the farmer is critical to support decisions on medium to long-term or investment type of lending. To develop this kind of data may be an expensive venture for FMS providers hence the need to explore others ways of enabling them access such data either through networks of strategic partners or ways of enabling financial institutions improve the horizon of their credit decisions using the already available data.

The 2 systems also scored highly when it came to reliability of their data as shown on the table above with FMS Provider 4 however lacking when it came to completeness of the data per individual farmer i.e. some of the data points per farmer as created on the system did not have the required data.

Overall, all the FMS providers’ lack of complete data on farm operations, as well as on the conditions that can affect productivity and output, becomes more pronounced when the data they collect is assessed against the full list of data considered to be important by financial institutions, as per Table 3 above:

Table 4: Individual Assessment of Farm Management Systems in Kenya

<table>
<thead>
<tr>
<th>FMS</th>
<th>FMS Provider 1</th>
<th>FMS Provider 2</th>
<th>FMS Provider 3</th>
<th>FMS Provider 4</th>
<th>FMS Provider 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Farmer</td>
<td>Sales transaction data, such as prices of inputs, inputs requested, and payments.</td>
<td>Quality of milk supplied.</td>
<td>Supplier No.</td>
<td>Transactional data - sales and payments.</td>
</tr>
<tr>
<td></td>
<td>Crops planted and acreage for each enterprise</td>
<td>Inputs to be utilized</td>
<td>Payment details</td>
<td>Quantity of milk supplied</td>
<td>Data on Transporters and Input suppliers</td>
</tr>
<tr>
<td></td>
<td>Training Needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inputs used by the farmer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Extension services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5: Individual Assessment of Farm Management Systems in Kenya

<table>
<thead>
<tr>
<th>FMS</th>
<th>FMS Provider 1</th>
<th>FMS Provider 2</th>
<th>FMS Provider 3</th>
<th>FMS Provider 4</th>
<th>FMS Provider 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reliability</strong> - the definitions for the various measures of reliability have been provided below the table.</td>
<td><strong>Accuracy</strong> Data transferred from data captured tools (manual or digital) into the system IS FREE FROM ERROR after being transferred. Data transferred from data captured tools (manual or digital) into the system IS FREE FROM ERROR after being transferred. Data transferred from data captured tools (manual or digital) into the system IS FREE FROM ERROR after being transferred. Data transferred from data captured tools (manual or digital) into the system IS FREE FROM ERROR after being transferred. Data transferred from data captured tools (manual or digital) into the system IS FREE FROM ERROR after being transferred.</td>
<td><strong>Consistency</strong> No incidence of Farm Management System changing data or affecting different fields when data is being inputted. No incidence of Farm Management System changing data or affecting different fields when data is being inputted. No incidence of Farm Management System changing data or affecting different fields when data is being inputted. No incidence of Farm Management System changing data or affecting different fields when data is being inputted. No incidence of Farm Management System changing data or affecting different fields when data is being inputted.</td>
<td><strong>Integrity</strong> Data keyed in by one person and verified by a 2nd person before being adopted. Therefore, best practice i.e. maker-checker principle observed when processing data. Data keyed in by one person and verified by a 2nd person before being adopted. Therefore, best practice i.e. maker-checker principle observed when processing data. Data keyed in by one person and verified by a 2nd person before being adopted. Therefore, best practice i.e. maker-checker principle observed when processing data. Data keyed in by one person and verified by a 2nd person before being adopted. Therefore, best practice i.e. maker-checker principle observed when processing data. Data keyed in by one person and verified by a 2nd person before being adopted. Therefore, best practice i.e. maker-checker principle observed when processing data.</td>
<td><strong>Completeness</strong> All the data points per farmer have all the required data captured. Only 50% of data points per farmer have the required data captured. System is being reviewed and hence we could not report on the completeness until the process is completed. Only 60% of data points per farmer have the required data captured. Only 20% of data points per farmer have the required data captured.</td>
<td></td>
</tr>
</tbody>
</table>

- **Completeness** - The measure of completeness looked at both accuracy and consistency of the data processing. The assessment was on whether the FMS providers were applying the practice of maker-checker (inputter and verifier) – one person keys in the data, the other person verifies that the data has been keyed in correctly before being adopted.
- **Integrity** – This measure checked whether data was changing at any point during the data processing i.e. whether the system was changing/altering the data captured or affecting other fields within the system during the processing of data.
- **Accuracy** – This measure looked at whether the data inputted into the system was free from error i.e. the correctness of the data. This also looked at how the data was being transferred from the data capture forms (e.g. in case of manual forms) into the FMS system and how the provider was avoiding or minimizing human error.
- **Consistency** – This measure looked at whether the system had all the data on a farmer profile as per all the data points created in its database e.g. if the system had 10 data points for capturing data on a farmer, the assessment was on how many of those data points have the required data. 100% in this case means that all the data on the farmer is captured. Each FMS provider self-reported on whether the data points are complete and if not complete, what percentage is complete. **Important to note that the various FMS providers had different number of data points per farmer profile so this measure only looks at the individual FMS and cannot be used to compare across the various providers as 20% could be 10 complete data points out of 50 data points compared to one reporting 100% completeness on farmer profiles with only 15 data points.**
Ranking 5- All Relevant Data, 4- Most Relevant Data, 3- Some Relevant Data, 2-Little Relevant Data, 1- No Relevant Data.

Table 6: The Ability of Farm Management System to Meet the Data Wish Lists of Financial Institutions.

As the above table shows, the Farm Management Systems reviewed for this study currently have very little data on the 7 broad categories. FMS Provider 4 and FMS Provider 1 led the group,
Despite scoring 27.5 percent and 25.83 percent respectively based on the above assessment against the data on financial institutions’ data wish list. Despite the low and high scores as per the above table, there is need as clearly articulated above for there to be a clear understanding on what data points provide financial institutions with the most predictive power to better assess farmers’ creditworthiness. This will enable FMS providers to determine how the level of investments that they need to make to ensure that they can serve lenders. This however doesn’t diminish the importance of the other data points as the potential users of the data held by FMS providers goes beyond lenders to such as insurance companies, suppliers of animal and crop products, government agencies, farmer-based organizations among others. Nevertheless, FMS providers must recognize that each market segment may need a different combination of the data points depending on the specific use for instance; financial institutions want to develop better and more predictive scoring models to support their agriculture lending activities.
4. Additional Challenges to Financial Institutions Incorporating Farm Management Systems

The financial institutions interviewed all expressed interest in exploring the potential of using FMS generated data to support their lending activities but they all need guidance on how to navigate this journey to ensure that they deepen understanding on how to use the data for lending as well as maximize the opportunities it present. Despite the need for support to financial institutions to move towards automated lending activities using credit scoring, many of them are very much aware of the key challenges that FMS providers must successfully address to guarantee that financial institutions adopt their data and that farmers consent to their data being accessed by third parties:

1. The integrity and reliability of the data provided
2. The need for robust and flexible systems integration options
3. Data privacy, protection, and access issues

1. Improving the Integrity and Reliability of Data on Farm Management Systems

Financial institutions have a fiduciary duty to safeguard the interests of their stakeholders, particularly depositors and investors. Thus, the data they use to determine how to allocate their investments must be of the utmost integrity and reliability. It is essential that the processes by which FMS providers collect data be both transparent and free of errors.

The seven financial institutions interviewed confirmed that they would be willing to utilize data from Farm Management Systems in their agricultural credit scoring. However, they would still need to follow up with the original providers of the data—namely, data aggregators or farmer cooperatives—to verify the accuracy of that data before making a final decision. Loan officers were concerned about the possibility that data for supporting credit decisions could potentially be manipulated. These concerns may point to a lack of confidence on the part of financial institutions in the completeness or integrity of the data that is currently provided or to the need for financial institutions to better understand the usefulness and completeness of that data for decision making.

FMS providers will need to address these challenges if financial institutions are to fully mainstream FMS data into their credit decision-making processes. The CEOs of each participating Farm Management System providers reported that they guarantee the integrity and reliability of their data by applying a maker and checker system when collecting and entering data into their systems. This claim can only be verified by using a two-step approach of auditing the process of data collection and entry, and then randomly picking samples of data from their systems and checking whether the same are representative of the farmers. Such an “audit” represents a critical step in the process of building confidence on the part of financial institutions to adopt the use of the data in FMS in credit scoring of farmers.

2. Building Robust and Flexible Farm Management Systems:

The seamless flow of FMS data to financial institutions is critical to ensuring that they can use that data efficiently during their underwriting processes. However, as financial institutions often have different internal policies on accessing data from external sources; FMS providers need to have various options available for financial institutions to access that data with relative ease.
For financial institutions that are willing to integrate their systems with FMS databases, the FMS need only guarantee that its databases are compatible with the internal systems of the financial institutions or are flexible enough to adapt to the needs of the financial institutions. Some institutions, however, might not permit direct integration of their systems with external databases, and thus, might prefer to log in into a portal and either view or pull the data from there before using it internally. To address the varying needs of potential clients, FMS providers need flexible systems.

Of the seven financial institutions interviewed for this study, five expressed interest in integrating their core systems, principally, their loan origination systems (LOS), with Farm Management Systems—if the data is reliable. The three institutions that were not interested in such integration cited concerns around security risks, their lack of a loan origination system that could utilize the data provided by a FMS, or simply that they would prefer to pull the data from an external database.

The participating FMS data providers indicated that their systems could be integrated with those of financial institutions, but this claim still needs to be assessed—evaluating it was beyond the scope of this study. The most critical stage of integration, per financial institutions, would be with their loan origination systems. However, FMS providers should consider making their data accessible through other channels. Secure web portals are one option for financial institutions that are unable or unwilling to integrate their existing systems with external databases.

FMS data providers must be able to deliver data to financial institutions in the form that they need. Depending on their loan origination systems or templates, individual banks might require similar data points but in different forms. For example, institutions that prefer not to open their systems to external ones may want to access FMS data remotely, perhaps over the web. FMS data providers need to understand the common requirements, as well as the unique data needs, that financial institutions have, and then use those similarities and differences to expand their data points while also making their systems more agile to service the varying needs of their users.

This represents a major opportunity for financial institutions and Farm Management System providers to work together to bridge the gap between the data currently provided by their respective systems and the data that financial institutions would prefer to utilize for credit underscoring.

3. Data Privacy, Ownership, and Right of Access
As they expand their data offerings, FMS providers must simultaneously ensure that their customer’s data is well protected and not revealed to unauthorized 3rd parties while also determining the ownership and use of the data that they hold. The legal issues around data privacy and security are of great importance when it comes to Farm Management Systems, as they often contain personal data, such as national ID numbers, on farmers.

How organizations handle this complex challenge depends largely on the legal framework of the country where they operate. In Kenya, the only relevant legislation in place regulating the use of digital data is the Access to Information Act of 2016. In line with Article 35 of the Kenyan

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See Annex 1 on Business for Alternative Data
Constitution, the Act grants citizens the right to access data on themselves that is held by public or private bodies.

In terms of data protection, the critical piece of legislation, the Kenya Data Protection Bill 2013, has yet to be passed. The bill was meant to give teeth to parts (c) and (d) of Article 31 of the Kenyan Constitution, which state that, "[e]very person has the right to privacy, which includes the right not to have data relating to their family or private affairs unnecessarily required or revealed and the privacy of their communications infringed". It is urgent that Kenya’s National Assembly enact the bill so that citizens have their data protected by whichever entity that holds it, be it public or private.

Despite the uncertain legal framework in Kenya around data protection, organizations that collect and disseminate this data must observe the highest professional standards to provide confidence to both their customers and farmers. They must ensure that:

1) Farmers are aware that their data is being collected and for what purpose. Basic concepts on data privacy should be used to communicate to farmers and updated on a regular basis as their data continues to be collected and used.

2) Farmers consent to their data being collected before it is collected. This can be provided to either the FMS providers or another party, such as producer organizations.

3) The data collected is protected to avoid exposing farmers’ data to unauthorized persons.

4) Farmers are aware that they can access their data as and when they need it. They should also be informed on how they can directly benefit from the data collected from them.

None of the Farm Management System providers interviewed indicated that they own the farmer data in their systems. They reported that the data is the property of the individual farmers, the farmer organizations, or the off-taker of the farmer’s produce. Because their systems aggregate individual or cooperative-level data, which is often confidential, FMS providers still need to have clear guidance around issues of privacy, ownership, and access. Several FMS providers reported that they undertake awareness campaigns and forums in which they inform farmers on these rights. However, these awareness campaigns and forums do not cover issues around mechanisms for remedy for the farmer in case there were to occur incidences such as violation of their right to privacy. Some of the providers reported that farmers provide consent before their data is collected, but no evidence was provided to corroborate this claim.

FMS providers also indicated that they take measures to guarantee that the data they collect is not revealed to unauthorized parties. However, none of them could clearly explain whether farmers have consented to the data being collected, and whether those farmers are aware of their right to access that data. The FMS providers also lack written policies that guide their collection, management, sharing or protection of data. There is need for them to put in place policies to govern these aspects of their business, and to ensure that they are operating within
the law. In the absence of clear legislation and internal policies, it is evident that FMS providers are unsure of how to handle key aspects of farmers’ data—namely, consent to use their data, awareness on use of data, access rights and privacy.

Table 7: Data Ownership Rights as Reported by FMS Providers

<table>
<thead>
<tr>
<th>FARM MANAGEMENT SYSTEM</th>
<th>DATA OWNERSHIP AS REPORTED BY THE FMS PROVIDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMS Provider 1</td>
<td>Aggregators/Off takers</td>
</tr>
<tr>
<td>FMS Provider 2</td>
<td>Farmers</td>
</tr>
<tr>
<td>FMS Provider 3</td>
<td>Processors and Farmers</td>
</tr>
<tr>
<td>FMS Provider 4</td>
<td>Co-operative Society/Producers Organization</td>
</tr>
<tr>
<td>FMS Provider 5</td>
<td>Co-operatives Society and Farmers</td>
</tr>
</tbody>
</table>
Conclusion and Recommendations

Conclusion

Data provided by Farm Management Systems providers, in coordination with fintech services, represents a promising pathway for financial institutions in Kenya to reach the financing needs of smallholder farmers. The financial institutions that participated in this study reported being interested in using such data to inform underwriting decisions in the agricultural sector, and smallholders. To develop this market, FMS providers should focus on four key components of their product offering:

1) Better alignment of their data offering to the data needs of financial institutions with a focus on providing the data points that best deliver predictive capability of lenders
2) Improving the reliability and integrity of existing data
3) Providing the seamless flow of farmer data from providers to users
4) Guaranteeing users of their data products and farmers with adequate protection around data privacy, protection, and access.

Collaboration between FMS providers and financial institutions has the potential to unlock the much-needed credit for smallholders. FMS can enable financial institutions to have visibility of smallholders prior to, during and post lending hence providing a platform on which the lenders can reach thousands of farmers with not only credit but other financial products. Other cost effective distribution models can also be explored with financial institutions getting the opportunity to work with farmer cooperatives or producer organizations as agents who can support farmers to originate loans as well as access other important bank product and services hence reducing their cost of serving rural communities. This also means that financial institutions will also be collaborating with organizations (cooperatives etc.) that are trusted by the farmers, are much closer to them for ease of monitoring due to their better view of farmers and their farming operations.

Through such partnerships and leveraging on Farm Management Systems providers to collate and organize farmer data in an organized and useful form, financial institutions could overcome most if not all the current challenges they face in lending to farmers and hopefully unlock the much-needed credit to farmers.

Recommendations

The report presents both general and specific recommendations based on the objective of the study and outcome of analysis of the results derived from the study:

General Recommendations:
1. There is need for concerted efforts by stakeholders involved in agricultural sector development to recognize the critical role that FMS providers can play in promoting greater financial inclusion and hence provide them with the support that they need to deliver on their mandate.
2. FMS providers and financial institutions need deeper collaboration through deliberate or facilitated means to build the necessary understanding and infrastructure needed to deepen lending to smallholders.
3. Financial institutions need to be made aware of the various FMS providers available in Kenya, the nature of data they hold, the value chains and regions they cover and
determining how useful the data they have can be used in enabling the lenders increase their engagement with smallholders.

4. FMS providers need to undertake independent audit and assurance exercises that cover issues around integrity of data, legal compliance on data protection and privacy to ensure that they build confidence in both providers and users of the data.

Specific Recommendation:
The research team is proposing a pilot project involving, FMS Provider 1, the most advanced Farm Management System and one or two of the financial institutions covered in the study\textsuperscript{10}. The aim of the pilot project should to:

1. Determine the most critical data needed by financial institutions to support their lending to farmers based on the predictive capabilities of the various data points.
2. Explore the use of the data in supporting traditional agricultural lending decisions to smallholder farmers and the impact it has on the flow of credit to farmers.
3. Explore the use of data in developing and deploying agricultural credit scores for use in automating the lending process to farmers and the impact it has on enhancing risk assessment and lending decisions.
4. Explore the use of Farm Management Systems in enabling loan origination at farmer cooperatives’ and/or FMS providers’ level.
5. Assess the actual efficiencies – cost, time etc. – accrued by financial institutions by leveraging the FMS providers to enhance lending and [increasing] the use of alternative distribution models such as agency and mobile banking as well as how that impacts on the cost of lending.
6. Determine the most optimal business model for a Farm Management System Provider to engage in the market with Financial Institutions and other users of its farmers’ data.

The outcome of the pilot should be used to further enhance the capacity of FMS providers to better serve the needs of financial institutions while at the same enabling a deeper understanding on how best financial institutions can leverage on their data for lending. Hopefully, this should lead to the deepening of financial inclusion for farmers.

\textsuperscript{10} Initial discussions with financial institutions reveal an interest in participating in the pilot.
Annexes

Business Case for Using Alternative Data to Increase Access to Finance for Smallholder Farmers

Financial Institutions (FIs) are moving towards complete customer knowledge for them to a) better manage customer relationships, b) create/tailor financial solutions, and c) better serve their customers through providing financial services targeted to their customer’s ‘life’ events.

Through the acquisition of tailored data products that are adequately priced and that augment the FIs existing lending processes, FIs can primarily realize benefits accruing from new insights that facilitate better, faster, and more actionable decision making. These include:

1. Increase revenue per customer
2. Decrease customer acquisition cost
3. Reduce customer churn
4. Enhance product and service innovation
5. Support portfolio monitoring and optimization
6. Support business planning efforts
7. Offload expensive data aggregation, preparation and analytics costs.

Are FIs, willing to pay for Alternative data? Yes, if the product is tailored and reasonably priced, FIs will pay as evidenced by their uptake of similar solutions such as credit rating, information and scoring solutions provided by credit reference bureaus and thus a clear revenue opportunity for FMS suppliers who can meet the need.

FMS Data as a Business Revenue Opportunity

FMS suppliers can meet the needs of FIs as they are not only sitting on volumes of farmer transactional data but, more importantly, they can collect targeted data that is relevant for building base data products. This data can then be combined with other data sets from financial institutions and other Agri-sector players to produce valuable data products and services that lead to access to finance, markets and networks.

Can this data aggregation ability, and or existing data be turned into value for the FMS?

To do so the FMS needs to have in place a) data, infrastructure and capabilities in place to develop valuable data products and services; b) map potential data and uses to valuable customers such as FIs and deployable with effective business models; and; c) clearly determining who to partner with and or enter into contractual and commercial data arrangements with, as determined by the target data product and or service.

The above considerations should be skewed to the target business model that FMS suppliers will apply. The models are dependent on the length of time and also a target market. In the case of FMS suppliers as data vendors to FIs, the target models may be;

Near term: Build to order

1. Build to order: Custom and or anonymized reports highlighting either specific customer data point or region and cluster data reports that provide support data to the credit decision.
Longer term: Custom models and or mix models

2. Pay per use: Allowing FIs to have visibility on data sets that they deem relevant and pay for only what they use. This could be small or large data sets.

3. Service bundles: These will require FMS suppliers to partner with other data vendors to provide unique reports that can be utilized by FIs, but only accessible through service packages.

4. Plug and play: Special access report formats that FIs can query and make use of, these, however, will be generalized data sets with very low levels of customization.

5. Subscription: FIs pay a fixed model for unlimited usage of the data products on offer by the FMS provider.

Depending on the business model, FMS suppliers must build data products that FIs will trust and value over a period. Investments in both relationship and trust building plus tailoring products will yield new business and revenue opportunities once FIs are fully sold on the usage of alternative data.

FMS provider’s approaches to data-as-a-business.
FMS providers can go into data-as-a-business from two starting points:

1. Volumes of transactional data that can be capitalized on, and
2. Valuable data but not enough of it (either completeness or volume) to make the business viable.

From the study, we find FMS companies having valuable (transactional) data but not enough of it (either completeness or volume) to make the business viable. Therefore, FMS suppliers must do the following to unlock their potential as ‘data vendors’ and further support access to finance for smallholder farmers;

1. Work with financial institutions to understand their specific needs from a data perspective,
2. Develop data products/services that meet the needs of financial institutions from a functional and cost perspective.

The FMS study clearly highlights the data needs of FIs. Regarding product development, FMS suppliers should use one of the following approaches to developing their data vending business;

1. **Option 1: Partner with other data suppliers in a mutually beneficially relationship;**
   a. Proposal: Partner with Credit Reference Bureaus to support the credit profiles of farmers. This will require joint product development.
   b. Upside: Access customers, leverage partner skills, assets and data, sharing of risk.
   c. Downside: Limited control over final product and customer relationship, low revenue potential, and scalability are based on product and partner’s ability to scale.

2. **Option 2: Enter commercial relationships with other data suppliers**
   a. Proposal: Enter contractual relationships to buy data that augments existing data sets with a view of delivering data products.
   b. Upside: Strategic control over products and customers, ability to achieve economies of scale and greater revenue potential.
c. Downside: High cost of data acquisition, slower access to the market, no risk sharing.

All in all, FIs are willing to use data products that are tailored to their needs and appropriately priced. FMS suppliers should, therefore, invest in developing valuable data products and services, collecting targeted data to build the required data sets and developing the right capabilities and infrastructure to deliver the products and services at the appropriate price for FIs.
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