IMPROVING SOIL TESTING AMONG SMALLHOLDERS

Data Analytics

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EXECUTIVE SUMMARY

Agrifiin Accelerate commissioned the Busara Center to examine the implementation of soil testing service to identify factors that drive use, and devise improvements that will lead to more take-up and adherence to recommendations. Special attention was paid to evaluate the limited pilot program conducted by iProcure.

Busara conducted research in three parts: analysis of existing data, in-depth interviews with agents and customers, and a phone survey.

We find that:

- **Perceived value** of the service is generally high, with a net promoter score (NPS) of 9.6/10 and is correlated to the cost.

- **Human touch** is critical to the process. Farmers who were in touch with agents were 3.3 and 4.1 times more likely to implement their recommendations and more likely to recommend soil testing to their friends respectively.

- Farmers are motivated to test by fear of bad harvests or to diagnose problems with their current practices.

- Youth are more than 1.2 times more likely to take up soil testing than older farmers but women are more likely to implement recommendations than men.

- Social networks and professional support services are both important sources of information for farmers and trust drives active use.
01 RESEARCH OVERVIEW
RESEARCH OBJECTIVES

Map:
(a) The soil testing process
(b) Recommendations process
(c) Farmers’ thinking at each stage

Identify the motivators and barriers to adopting:
(a) Soil testing
(b) The recommendations

Understand what farmers perceive as the benefits of adopting:
(a) Soil testing
(b) The recommendations

Design interventions to increase the adoption of:
(a) Soil testing
(b) The recommendations

Improving Soil Testing Among SHFs: Data Analytics
To achieve the objectives, we laid out various activities across 5 different counties: Kericho, Nyeri, Nakuru, Kirinyaga and Kiambu.

We engaged farmers in person and over phone surveys to explore the overarching themes.

<table>
<thead>
<tr>
<th>What</th>
<th>Who</th>
<th>gender</th>
<th>tested soil</th>
<th>implemented recommendations</th>
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<tr>
<td>QUALITATIVE In-depth interviews</td>
<td>3 SoilCares Partners</td>
<td>10 women</td>
<td>18/24</td>
<td>10</td>
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<td></td>
<td>24 farmers</td>
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<td></td>
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<tr>
<td></td>
<td>5 agents</td>
<td></td>
<td></td>
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<tr>
<td>QUANTITATIVE Phone surveys</td>
<td>iProcure + other agents</td>
<td>30 women</td>
<td>105/140</td>
<td>70</td>
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<td>150 farmers</td>
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Overarching themes
- Perceptions and misconceptions of the benefit of soil testing
- Financing
- Recommendations adherence
- Willingness to pay
- Youth & women
- Agent support
- Human touch
- Social network influence
- Loss aversion

Limitations - The available data biased our study largely towards soil testers.

**Process**

**In-depth interviews**
Generate overarching themes that influence the efficacy of the process leading to (repeated) use and adherence to recommendations

**Phone surveys**
Quantify themes and determine key predictive variables that influence adoption, repeated use and adherence to recommendations

**Limitations**

**Few non-adopters were included in this analysis**
Providers kept no record of non-adopters to allow direct follow-up with them.

**Phone survey attrition**
Initial sample targeted was 300 farmers, however as a result of outdated phone records, unavailable respondents and few failed consents, the final sample was almost halved.

**Phone survey sample selection**
iProcure farmers (90) were matched to characteristically similar farmers from other providers (undefined). It sought to determine success of iProcure soil testing process.
The phone survey targeted farmers who had previously tested their soil but also gathered self-report of soil testing experience.

The farmers were largely small scale farmers who grew 1-2 crops and had been farming for about 1 year on average.

**TARGET SAMPLE**

**Phone survey**

The phone survey targeted farmers who had previously tested their soil but also gathered self-report of soil testing experience.

- **88.1%¹** Tested their soil
- **67%²** Implemented recommendations
- **61.4%** Switched crops
- **9%** Tested soil more than once

**Average net promoter score**

- **9.6**

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1. This is a self report based on farmer recall despite entire sample being drawn from AgroCares i.e. past soil testers.
2. This is based on those who reported having tested their soil (88.1%).
Based on the engaged partners, there were 2 primary models through which suppliers offered the services.

**PROVIDER MODEL**

**Agent finds farmer**
Farmer is contacted by agent at institutional level (agrovet/cooperative) and visited at their household to have their soil tested

**Pro:**
- Strong relationships developed that sustains adoption and active use
- Follow up by either farmer or agent is made easier

**Con:**
- Time consuming
- Heavy human touch needed to sustain
- Difficult to scale - agents have limited capacity

**Farmer finds agent**
Farmer seeks out agent to get their soil tested (bring their soil to a more central location and they would receive results at a later date)

**Pro:**
- Based off of established formal networks hence:
  - Trust is already established
  - Feedback loop secured
  - Cost effective for the supplier

**Con:**
- Delay in receipt of recommendations
- Additional effort required on the farmer side
  - Lack of personal touch and access to follow up
02

CUSTOMER
JOURNEY
Farmers then receive their recommendations. Recommendations are then implemented in their farming practice. Farmers then have their soil tested, with timing (before planting) being critical. Awareness is raised, and farmers make a commitment to test their soil. Commitment is shown as farmers recommend soil testing and benefits to fellow farmers. Availability is demonstrated through agent and society level engagement. Repeat testing is shown as farmers test their soil after implementing recommendations. Farmers become soil testing ambassadors, recommending soil testing and benefits to fellow farmers.
Different agents had different customer journeys towards soil testing.

- **Awareness**: Farmers are educated on soil testing process and its benefits.
- **Commitment**: Farmers make a commitment to test their soil.
- **Register**: Different steps leading to financial commitment.
- **Agent finds farmer**: Provider model options.
- **Farmer finds agent**: Soil test.
- **Soil test**: Farmers then have their soil tested. Timing (before planting) is critical.
- **Received on the spot** vs. **Received at later date**.
- **Recommendations**: Farmers then receive their recommendations.
- **Implement recommendations**: Farmers then implement the recommendations in their farming practice.
Opportunities and barriers may propagate or hinder farmers moving across the customer journey.

**Opportunities & Barriers**

### Awareness
Farmers are educated on soil testing process and its benefits

### Commitment
Farmers make a commitment to test their soil

### Soil Test
Farmers then have their soil tested
*timing (before planting) is critical*

### Recommendations
Farmers then receive their recommendations

### Implement recommendations
Farmers then implement the recommendations in their farming practice

**Opportunities & Barriers**

- Referrals from personal and professional networks
- Poor timing of the test
- Unavailable funds
- Perceived high cost of soil testing
- Lack of tangible/visible evidence
- Lack of support to interpret results
- Outdated results (after delayed rec’s)
- Literacy challenges
- Status quo
- Financial constraint
- Crop failure
- Price discounts
- Unforeseen crop failure
- Price discounts

**Opportunities & Barriers**

- Financial freedom
- Literacy
- Status quo
- Financial constraint
- Follow-ups/support
- Farmer investment
- Financial freedom
- Literacy

**Opportunities & Barriers**

- Delayed recommendations
- Poor timing of the test
- Unavailable funds
- Perceived high cost of soil testing
- Lack of tangible/visible evidence
- Lack of support to interpret results
- Outdated results (after delayed rec’s)
- Literacy challenges
- Status quo
- Financial constraint
03

FARMER AND AGENT PROFILES
Meet Farmer Richard, Model Farmer

The farmer who tested his soil and benefited from his implementing his recommendations

A 48-year-old maize and beans farmer from Nakuru who earns his livelihood from farming. He is open to testing new farming practices and gets information from his agrovet agent.

Based on the recommendation, beyond his usual fertilizer share, he applied organic manure and top dressed before and after flowering. He was able to get 10 more bags of maize over his standard harvest.

The test was offered as a complimentary service by a local cooperative. He was willing to pay more than Ksh. 1000 despite it being offered free of charge the first time. He believes that the testing should be done every season. He hopes to try a new crop in the next season.
Meet Farmer Gerald, Determined Farmer
The farmer who tested his soil and is yet to benefit since he didn’t implement the recommendations

A 60-year-old coffee farmer from central Kenya who is a retired teacher. He also farms cabbage and tea. Although he had known of soil testing for a long time he did not use the services until he started experiencing lower yield in his coffee harvest.

He did the test and the recommendation was to adjust the quantities and intervals of application and adopt a new fertilizer.

Because the test was done after planting season - when the recommendations would be actionable, he is committed to applying the results in the next season. He felt a price of Ksh. 1500 was fair. He believes to improve the process, having proper follow up will support farmers implement the recommendations better.
Meet Farmer Vivian, Cautious Farmer

The farmer who did not test her soil at all

A 32-year-old potato farmer from Kericho who earns her livelihood from farming. She is the primary caretaker of the land though she consults her husband occasionally to make decisions about the farm. She heard about soil testing from a friend but was yet to take up the service. She is waiting to see results from her friend’s crop before taking it up. The price slightly deterred her as she prioritizes other inputs to soil testing but if benefits can be seen she would be willing to pay up to 600 KShs.

She hopes to expand her farming business someday in the future. She is comfortable with her existing farming practices as they work for her so far.
Meet Agent Sheila, Star Agent

The “star” soil testing agent

Sheila is a 22-year-old soil testing expert who is inspired by making farmers more productive. She approaches farmers at tea buying centers as well as farmer training forums.

She is often persistent with farmers: she will reschedule and set time with farmers to whenever they are available for soil testing. She believes establishing relationships with the farmer to the point they trust you as an expert is key to ensure adoption of soil testing and repeated testing in the long run. This allows easy following up to support farmers implement their recommendations.
Based on the findings, the following themes were the most relevant to adoption of and active use of soil testing among farmers.

**MAIN THEMES**

**Adoption**

- Willingness to pay
- Loss aversion
- Timing

**Active Use**

- Social network influence
- Bundled products
- Human touch
On average more than 70% of the farmers agree that soil testing increases productivity, yield and knowledge of alternative crops to grow. However, the frequency of testing received varied responses with only farmers who had implemented recommendations strongly agreeing in testing every season.
Farmers recorded an average price of Ksh. 1207 as a bargain for soil testing.

Current price being offered by iProcure is Ksh. 1000.

Non-adopter had slightly higher averages but with larger variance.

Farmers who did not pay were more likely to not implement the recommendations. The precedent caused them to default to a low perceived value of the process.
Harvest income and savings are higher likely facilitation methods by most of the farmers.

92% of the farmers believe the price is fair. 60% are not likely to borrow to finance the soil test.

Primary reasons that farmers would not take loan for soil testing was:

1) The amount (Ksh1000-1500) was too low to take out a loan and
2) There is general fear of high interest rates with loans.

“Loan is for emergency and serious things of soil test is not that serious and can wait for post harvest”

-Farmer
**INSIGHT 4**

Human touch is required for comprehension and conversion

Farmers are more likely to take up soil testing and ultimately implement recommendations with sufficient follow ups. However these points also present potential failure points if not well implemented or defined.

- **41%** of farmers have not been in touch with the soil testing agents since after the soil test was carried out.

- **98%** of interactions with the agents are initiated by the farmer.

Follow up most requested by farmers was for agents to support:
- Interpretation of recommendations
- Check in on adherence to recommendations

Farmers who have been in touch with agents are:
- **1.9x** more likely to test their soil next season
- **4.1x** more likely recommend soil testing to other farmers
- **3.3x** more likely implement recommendations

*Statistically significant at 95% confidence level
INSIGHT 5
Social influence is crucial in driving adoption and active use

Farmers hearing and seeing evidence from their fellow farmers goes a long way in sparking interest and encouraging recommendations adherence.

Formal channels are trusted to be knowledgeable while media’s lags significantly behind other information sources especially in times of challenges.

70% of the farmers know other farmers who have tested their soil.

However, farmers more likely to adopt soil testing when advised by familiar social anchors.

“"The rest of the group members were doing it so I decide also to do it.”"  
-Farmer
INSIGHT 6

Bundling value added products/services drives repeated interest and use

Beyond offering the test independently, to increase the perceived value of the test, offer the test alongside other services/product.

From the qualitative interviews, offering soil testing as a complimentary service to other products and services seemed to drive adoption.

This should be tested as we cannot tell for sure based on the small sample size in this study.

48% of farmers believe that they should test their soil yearly

Bundled product options offered with soil testing:
- Farm inputs
- Access to market
- Credit
- Information services
INSIGHT 7
Losses more than future gains nudged farmer to test their soils

Why fix it if it’s not broken? Farmers would not take up recommendations if it went against their longstanding practices.

» 100% of farmers who reported having suffered a reduced productivity/loss despite positive environmental factors in the past season were keen to take a soil test and open to implementing the recommendations.

» 0% of farmers who did not implement recommendations felt that the recommendations contradicted their own practices. There is general trust and acceptance of the recommendations being consistent to farmer knowledge.

“They were clear though I did not follow them because even before soil testing I have been getting a good harvest so why incur an extra cost by adopting a new method while the old one is still working.”

-Farmer
Timing of the test can make or break

Scheduling outreach and actual soil testing to match the farmer season cycle to lock in positive decision making.

Leveraging farmers present bias to target optimal times can accelerate uptake of the product.

Farmers tended to procrastinate implementing the recommendations waiting for the next planting season due to poor timing of receiving the recommendations - which poses a risk of forgetfulness.

85% of farmers believe the best time to test their soil is before planting.

Thursday has the highest number of soil tests across all partners.

“I had already planted my crop so asked the agent to come back before the next season starts”

-Farmer
Delay in receipt of recommendations was the leading challenge in implementation

33% of the farmers did not implement the recommendations overall.

Farmers often prefer and refer to **physical copies** of results. Close to zero referred to the soft versions availed.

Cost of implementing the recommendations was a secondary challenge.

The highest cause of farmers not implementing the recommendations was **not receiving the recommendations**. This was in the case of farmers who brought the samples to cooperatives for testing and required to pick results at a later date.

“Some farmers are not from the region so it is hard for us to follow up with them to ensure they are implementing the recommendations.”

-Agent
Perceived high cost may be a result of erroneous farmer input

The process required farmers to input average output which is often overstated.

Recommendations appear expensive (large amounts of fertilizer recommended) due to overstated farmer self-reported harvest outcomes. This is input into the soil testing machine at the time soil is being tested.

This results in recommendations being overstated and hence becoming expensive beyond their average input budget.

Calibrating the recommendations based on farmer acreage will ensure realistic estimates for recommendations.

Limitations on existing input and crop details on the system has been a challenge.

Farmers have suspected that the agents have been marketing specific fertilizers.
Younger farmers are almost twice as likely to test their soil.

There is no significant difference between men and women.

The fewer crops a farmer keeps, the more likely they are to test their soil.

The longer a farmer has been farming and the larger their acreage the more likely they are to test their soil.

NB: The sample is small hence we are cautious about calling these relationships causal.

Predictors of likelihood to test soil next season

- Gender: Female
- Agent: iProcure
- Age segment: Youth
- Education level: Secondary
- Education level: University/college
- Total number of crops
- Years of farming
- Size of land
- Applied recommendations: Yes
- Contacted agent after soil test: Yes
- Ratings: General experience of soil tests
- Rating: Experience with agent
- Is the price fair?: Yes
- Net promoter score
- Switched crops: Yes
- Number of soil tests

Coefficient estimate
This was based on recommendation adherence self-report.

Farmers who got in touch with the agent are **3.3 times more likely to implement recommendations** from soil testing, as compared to those who did not³.

Women are more likely to implement the recommendations than men.

From agents’ perceptions, farmers in farming for business are considered more likely to implement the recommendations.

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³ The sample is small hence we are cautious to infer pure causality.

**NB:** Recommendation implementation was self report, there exists a gap in accurate data to track this.
Leveraging formal and informal networks (e.g. cooperatives and chamas) to raise awareness and finance soil testing could drive adoption.

Model farmers could be used to provide real examples of the benefits of soil testing to more cautious farmers.
• This structure could come within cooperative organizations.
Providers’ model should be structured towards immediate results printing and bringing agents to support farmers at crucial time (recommendation implementation)

Utilization of scheduling and reminders for visibility and to keep up interest will be important.

Getting support right is key! Given the high cost of engaging agents and farmers, focusing contact to post-recommendations will drive likelihood of recommendations implementations within effective costs.

Provider Alternative Models

Scheduled household visits model
Farmers register their soil testing household visits to specific times that the agent can efficiently coordinate tests over multiple locations

Aggregated central location model
Farmers bring their soil for testing on a scheduled day to an agreed central location (DVAs/communal centre) where the agent will be present to test the soil and provide immediate print outs
Including DVAs into the process to reference specific farmers recommendations.

Digital messaging can help understanding and application of recommendations.

Particularly, communicating the specific recommendations around the planting period can drive implementation.

Poor/declining yield vs higher yield messaging to drive adoption could be useful to test.

**Engagement Propositions**

**DVA record keeping of farmer recommendations**
Farmers will have their recommendations stored with the DVA and will be referenced in the next season’s purchases for planting

**SMS Reminders**
Farmers receive concise recommendation details (based on their most recent test) towards the planting expense period.

This could be coupled with general best practices advise can improve farmer practices generally
Bundling of soil testing with other services to drive adoption and repeated use

Coupling soil testing with other crucial services e.g. information or input supply or water tank provision could drive adoption

Tests could be carried out to identify the optimal bundled services based on specific contexts

Setting up comprehensive data systems to better estimate adoption & recommendations adherence

Providers should capture data on non-adopters to dig into non-adoption factors that are controllable e.g. timing

Create feedback loop with DVAs to allow tracking of recommendation adherence based on purchase of inputs

Calibrating recommendations on acreage rather than harvest self-reports to fix erroneous high costs of inputs and eliminate cost as a barrier
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