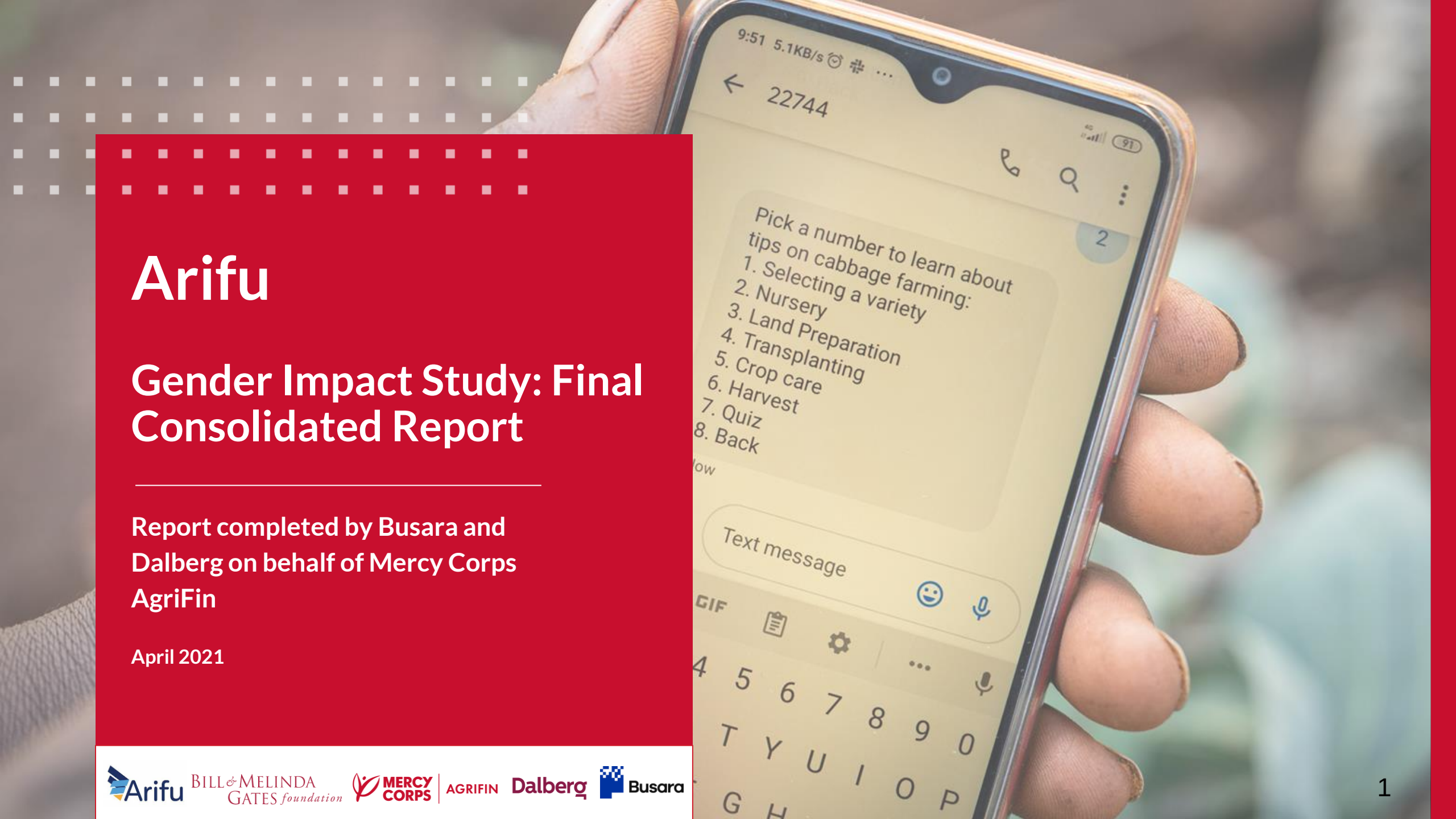
Arifu

Gender Impact Study: Final Consolidated Report

Report completed by Busara and Dalberg on behalf of Mercy Corps AgriFin

April 2021



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Study Objectives

About Mercy Corps AgriFin

We work with over 9 million farmers and 130 partners across Africa

Mercy Corps' AgriFin Digital Farmer (ADF) Program is funded by the Bill and Melinda Gates Foundation to help organizations design, test and scale digitally-enabled services for Africa's smallholder farmers.

- Objective is to develop services that increase **farmer income, productivity and resilience**, with 50% outreach to women.
- Work with **private & public sector scale partners** such as banks, mobile network operators, agribusinesses, technology innovators and governments.
- We help our partners develop bundles of digitally-enabled services, including **smart farming, financial services, market access and logistics** supporting data-driven partnerships.

The AgriFin Digital Farmer (ADF) program is championing the development and deployment of a range of full-service digital ecosystems to support end-to-end farming activity across East Africa.

Context

Women account for nearly half of the world's smallholder farmers and greatly contribute to agricultural activity yet are disproportionately affected by systemic challenges in the agricultural sector such as access to markets, credit, inputs, knowledge, and land. Digital solutions have potential to revolutionize the livelihoods of farmers, however, **challenges that constrain meaningful use of digital services by female users limit sustainable impact for women smallholder farmers.**

The agriculture sector in Africa has been facing systemic challenges over the past decades including issues around markets, credit, quality inputs as well as knowledge and networks. These **challenges disproportionately affect female smallholder farmers** who contribute greatly to agricultural labor and productivity.

Digital solutions have potential to revolutionize the livelihoods of farmers, however, consistent challenges that constrain meaningful use of digital services by female users limit sustainable impact for female smallholder farmers.

The Bill and Melinda Gates Foundation has engaged AgriFin to understand **the impact of digital services on women smallholder farmers,** and the factors driving and inhibiting their adoption and usage of the services.

This study consisted of 3 phases of research and this report highlights the key learning from each phase.

Source: World Economic Forum, "Women grow 70% of Africa's food. But have few rights over the land they tend", 2018

Objectives

This assessment was conducted to map the impact of digital product and services on women farmers, and factors driving its adoption and use by farmers, particularly women.

This report presents the results of a gender impact assessment of Arifu's SMS based learning programs on farmers, particularly women. The main objectives of the study were centered around understanding knowledge/attitudes towards digital solutions, usage of Arifu by gender, factors that drive adoption and use, particularly by women as well as impact on women smallholder farmers' livelihoods and learnings for delivering digital solutions for women.

This report is structured to convey the following insights inline with the objectives outlined above:

- User engagement statistics of a selected sample of men and women users
- Factors influencing adoption and usage of Arifu from qualitative interviews with farmers and key informants,
- Elicitation of mental models that inform women's decision making around uptake and usage of Arifu
- Overall impact of Arifu on women's livelihoods
- Recommendations for improving adoption, utilisation, and impact of Arifu products and services, particularly for women.

Executive Summary

Executive Summary- Overview

We evaluated user engagement data for the learning platform embedded in 3 partners of Airfu (selected by Arifu) and in-depth interviews with farmers and informats to understand user interaction with a vast range of learning programs under various value chains as well as users' learning outcomes:

DAT	Google.org	IFDC
Maize, Potato. 20 Programs	Drought tolerant potato, Poultry, Potato. 20 Programs	Potato. 11 Programs

The number of interactions indicates the number of times learning content was pulled via SMS by each user engaging with Arifu. Overall interaction levels across all partner samples were mostly within the 1-50 interactions band with the exception of the Google sample which contained a few more active or super users who engaged multiple (50+, 100+) times with various learning programs. Men tend to engage more on Fridays while women engage mostly on Fridays and Saturdays. The spread of interaction engagement was mostly with the range of 1-5 days for over 70% of users. In addition to pre and post planting programs, men demonstrated more interest in a diverse election of programs from marketing and produce sales to record keeping as well as some crop management programs like weed, nutrient and pest management.

Overall, we find that **Arifu has enhanced the livelihoods of women farmers.** Knowledge gained from Arifu has helped women learn better agricultural practices, which has led to increased yields and productivity in their farms. This has resulted in increased incomes for women and their households, granting women greater financial independence. Women have used the additional income to raise the living standards of their families, including in diversifying nutrition and paying school fees for their children. Women farmers also indicate Arifu's learning modules have motivated them to adopt a commercial lens (agribusiness) in their farming practices. Knowledge gained on Arifu has also led to cost savings for some women farmers, with some learning how to invest better, increasing their ability to repay loans taken out.

Source: Arifu Literature Review, Arifu Data, Dalberg and Busara Analysis

Executive Summary- Overview

Women, however had little to no interaction with these management programs with the exception of pest and disease management. We also observe stronger engagement by women in the poultry value chain compared to the crop value chains based on completion rate metrics and actual women users pulling content. Given that poultry farming can be practiced domestically it is feasible to assume this is one of the more feasible value chains especially for married women who spend more time at home. Women may be interacting more with learning content based on gendered roles and social norms around farming (Meinzen-Dick et al., 2004). Tailoring the onboarding process to prime women to take up more diverse programs within and beyond their value chain may help Arifu empower women with the confidence to exercise more authority in decision making or contribute more to decision making around their crop and animal farming activities. Qualitative insights from the second phase will help inform cultural factors driving learning and weak or strong decision making authority.

Adoption: All farmers across the 3 partner projects interacted with a learning program at least once (i.e. at least received one SMS for certain program), however, overall interaction across the various learning programs was low with a few farmers accounting for very frequent usage. Across all learning programs we observed that men engaged with a larger selection of learning programs. We observe slightly better adoption under the Google, defined by frequency of interactions by users. However for crop based programs completion rates were slightly higher for the DAT sample The low adoption across the various program offerings could be explained by personal learning preferences, economic factors such as infrastructure and social factors around cultural norms and gender roles in knowledge attainment, Akudugu et al (2012).

Learning Programs: We observe similar gender-based trends in the types of learning programs across all 3 project partners. Women interact more with crop planting related modules like seed selection and less with post-harvest and administrative modules like content on selling products or farm records and weed or nutrient management. Under the DAT sample we observed that learning program of borrowing was most popular for both men and women, while women demonstrated slightly more interest in the saving program. Overall men also demonstrated active interaction in crop planting modules but also showed more interest a diverse selection of modules where women's engagement is weaker such as marketing, varieties selection, and harvesting.

Source: Arifu Literature Review, Arifu Data, Dalberg and Busara Analysis

Executive Summary- Overview

Women have also showed more interest in leveraging farmer groups in poultry farming but less interest in leveraging farming groups to increase crop harvests. We find that the key drivers for farmers who become high-frequency users are newness to Arifu; curiosity, and time availability.

Knowledge Sores: Women have outperformed men in poultry knowledge scores under the Google poultry value chain. Both men and women performed better on average under the IFDC sample compared to the other 2 samples, with minimal discrepancies in scores between genders.

Completion Rates: Completion rates were low and ranged from 0-22% across all learning program value chains of all partners, with the exception of the poultry learning programs under the Google menu, which had the highest rates. Men completed more learning programs than women, but we observe that completion rates for poultry learning programs under the Google sample was higher for women, with women achieving the highest completion rate of all users for the improved chicken program under the Google poultry menu. In addition, women also had relatively higher completion rates for planting or pre-planting programs such as seed selection, soil testing and land preparation compared to administrative or management programs like farm record keeping and weed or nutrient management.

Women also face a few other challenges across the user journey. Low brand recognition of Arifu, lower trust levels among women farmers, and limited peer-to-peer sharing contribute to the low conversion rates of women on Arifu. Additionally, lack of on-the-ground agents, as well as challenges finding Arifu's registration code online limit conversion of women farmers into users. Women users reported having less time to use Arifu due to household and childcare responsibilities, resulting in men being more likely to be high-frequency users than women.

In product use, gendered roles in agriculture limit usage of some programs by women farmers. Further, lack of an onboarding message outlining all content available on the Arifu platform results in a drop in usage when women users end engagement with initial learning content. Lack of a follow-up message to re-engage users once they end use of initial content offering on Arifu is also contributing to low engagement. Availability of related learning content from other platforms, particularly those that offer in-person, on the ground training, also limits usage as women prefer in-person trainings. Storage and internet connectivity limitations of feature phones also present challenges for women users.

Source: Arifu Literature Review, Arifu Data, Dalberg and Busara Analysis

Executive Summary- Drivers and Barriers of Adoption and Use

Factors driving adoption of Arifu by women farmers:

- Mitigating digital literacy challenges - A simple, easy to follow registration process encourages sign-ups among women farmers
- Use of SMS and a personalized welcome message that new women users receive upon completing registration makes farmers trust Arifu, and feel valued. Women's decision-making process to register is short due to learning being perceived as a low-risk product. Interest in learning about specific value chains also drives uptake

Barriers to women farmers' adoption of Arifu:

- Low brand recognition of Arifu and recent high rates of scams through SMS limit trust and inhibit uptake of Arifu. Limited peer-to-peer sharing about Arifu among female users contributes to low levels of awareness, trust and registration.

Factors driving active use of Arifu by women farmers:

- Product features - the depth and specificity of information of Arifu's learning modules drives engagement and use of characters makes content retable. SMS prompts from Arifu act as reminders, driving engagement among women farmers, who find them valuable due to having more limited time to engage with content than men farmers
- Participation in more than one value chain and evidence of success creates trust and drives progression to engage with content on other value chains by farmers
- Knowledge gained from Arifu has driven women's uptake of new products and services e.g. loans

Barriers to active use of Arifu by women farmers:

- Gendered roles in agriculture limits the value and usage of some modules by women farmers
- Digital literacy challenges among some women farmers- lack of an onboarding message outlining all content available e.g. all value chains available on Arifu's library, limits usage among some women farmers due to digital literacy challenges, limiting their ability to explore modules without guidance
- Lack of a follow-up, on ground agents and re-engagement message once users exhaust initial content also contributes to low usage due to digital literacy challenges among some women farmers. Women farmers are more likely to own feature phones, which have some limitations e.g., limited storage capacity for SMS content

Executive Summary- Impact

Impact on women farmers' livelihoods. Overall, the assessment finds that Arifu has enhanced women farmers' livelihoods through:

- **Increase in yields and income**: all women farmers interviewed report that knowledge of better agricultural practices gained from Arifu led to an increase in productivity/yields and consequently increased income from their farming ventures.
- **Agribusiness**: some women farmers indicated that they now see agriculture as a viable business venture (kilimo biashara) as opposed to just a subsistence activity due to knowledge gained from Arifu.
- **Cost savings**: Some women farmers report that the knowledge they gained through the Arifu platform helped them successfully invest in new agricultural ventures, particularly poultry, helping them avoid making losses.
- **Loan repayment:** some women farmers indicate they learnt how to invest loan money better, enabling them to repay their loans.

Impact on women farmers' lifestyles. Overall, the assessment finds that Arifu has enhanced women farmers' livelihoods through:

- **Increased agency**: Women farmers indicate having increased control to learn. This agency comes from having access to the content at any time, giving them the ability to decide and plan on how and when to learn.
- **Time savings**: some women farmers indicate that adoption of new farming techniques and inputs have enabled them to save time which they now spend on other productive activities. Time savings result after they learn about, and adopt new, efficient farming techniques
- **Improved decision-making**: Gaining knowledge from Arifu on value chains of interest has enabled women farmers to contribute to agricultural decisions in the household e.g. if to invest in new value chains.
- **Confidence**: All women farmers interviewed indicate that knowledge gained on Arifu has helped them become confident farmers, boosting their self-esteem and trust in their abilities as farmers.
- **Improved social status**: Women farmers report a noticeable change in social standing in their villages and groups resulting from the application of knowledge gained from Arifu. Women farmers report that the observable success on their farms has resulted in respect from their peers who often inquire how they gained their success.

Based on the qualitative insights gathered as well a farmer demographics **3 segments of women farmers were identified:**

- Self Starters: They are the most active women users and the most digitally savvy
- Curious Followers: They are average women users and moderately digital savvy
- Uninterested Skeptics: They are the lowest users and the least digitally savvy

Executive Summary- Recommendations

To further engage and support women farmers, we identify three key levers of opportunity for Arifu, specifically:

1. Enhance conversion of women farmers into Arifu users

- **Enhance recognition of the Arifu brand** to increase farmers' trust;
  - **Create more awareness about Arifu to promote brand recognition and trust through channels women farmers interact with most** e.g., farming shows and local-language radio and TV stations.
  - **Encourage women farmers to refer their peers to join Arifu via SMS and potentially offer incentives for peer references, e.g., airtime**. This can help raise awareness, trust and consequently conversion as women are more likely to trust services referred by peers.
  - **Develop campaigns** with partners that are well-known and trusted to increase awareness about and trust in Arifu
- **Include directions of the registration process more prominently on the Arifu website** for easier reference and registration.

2. Deepen usage of learning modules

- **Make Arifu learning modules more convenient** for women users to engage with;
  - **Adjust timing of SMS reminders to times that women farmers are more likely to be free** e.g., lunchtime, evening and Sundays. Due to household responsibilities of women, improved timing of reminder SMS can enhance engagement.
  - **Send SMS reminders encouraging women farmers to save the Arifu code**. Women are more likely to have feature phones which have limited storage capacity leading to loss of Arifu code.
- **Consider additional investment** in alternative modes of content delivery;
  - **Consider adopting IVR** as an additional content delivery mode to increase engagement among women who may need to multi-task while learning
  - **Offer a toll-free number** that farmers can call in case of questions/need support when learning.
- **Work with partners to leverage their agents** or on the ground contacts to support farmers who may need further guidance accessing/using Arifu.
- **Work with partners to help target and effectively engage women farmers** in content development and delivery.

Executive Summary- Recommendations

3. Encourage sustained use and advancement

- **Make more content available and accessible**;
  - **Send reminder messages prompting farmers to explore other modules** after their initial learning module/path and offer an overview of other modules available.
  - **Broaden learning modules to additional value chains** to increase the range of options that women farmers can choose from e.g., beans, bananas, trees, onions etc.,
  - **Provide directions on where to access additional products and services** mentioned in Arifu content e.g., soil testing and certified inputs.
- **Release content in a timely manner** matching crop cycles or current events e.g., send maize modules before the maize season and content on managing pests when they are prevalent

Study Methodology

Study Methodology

To achieve the learning objectives, a mixed approach is applied and executed by Busara and Dalberg over three phases:

Data Analytics: Data analysis of a selected sample of administrative data on farmer usage of Arifu by gender.

Qualitative Research: Explores farmer experiences and journeys for each partner product with in-depth interviews with a subset of farmers and stakeholders.

Behavioral Mapping: Identifies shared mental model themes (from the farmer interviews) of how farmers perceive the Arifu value proposition and the behavioral barriers and levers that may be driving decision making around usage.

- Four partners have participated in this study:
  - **Arifu**
  - AgriPay (by Zanaco)
  - DigiFarm
  - FtMA (Farm to Market Alliance) Kenya

Study Methodology

Research Method	Description
LITERATURE REVIEW	We reviewed **key documents,** including past AgriFin, Dalberg, BMGF and internal research on Arifu (Arifu Pitch Deck), as well as relevant external literature on topics around digital agricultural technology and and best practices in reaching women farmers through digital services compiled internally by Arifu.
Data Analytics	We conducted **quantitative data analysis of Arifu data** to identify key themes and questions for deeper probing in farmer and informant interviews.
KEY INFORMANT INTERVIEWS	We are conducted **key informant interviews with 2 of Arifu"s key partners:** • Safaricom • IFDC
AGENT AND FARMER INTERVIEWS	We have conducted **18 Human Centered Design (HCD)--inspired interviews; 9 with female farmers, and 9 with male farmers.** We spoke to 9 female and 9 male farmers in Bomet, Embu, Kericho, Kilifi, Makueni, Migori, Murang'a, Narok, Naivasha, and Nyandarua counties

Note: We targeted our recruitment to ensure a diversity of women's experiences would be captured, including using selection criteria around age, education level, marital status, and smartphone ownership. The full breakdown of farmers and agents interviewed is available in the annex.

Arifu Sample Data Summary

We analysed Data of a sample of Arifu users from 3 Arifu delivery partners

- DAT (World Bank Initiative, Disruptive Agricultural Technology)
- Google
- International Fertilizer Development Center (IFDC)

Our data analysis focused on user training interactions, training completions and timing of learning content access. We randomly selected a gender balanced sample for analysis.

DAT: Final Sample Size-179

DAT Maize Original Sample : 174 respondents (3 users did not specify gender):

- 60 women & 114 men. We applied a randomization function in R to select 60 men from 114 to ensure a balanced sample across gender. The final sample size after randomization was 120.

DAT potato Original Sample: 59 respondents:

- 30 female & 29 men. Since it is quite balanced, no randomization was required. 27 respondents from Potato also appear in Maize.

Google: Final sample Size-234

Google Original Sample: 380(10 users did not specify gender)

- 117 women & 263 men. In order to ensure a balanced sample between men and women we applied a randomization function in R to randomly select 117 men to achieve a final sample size of 234.

IFDC: Final sample Size-1046

IFDC Original Sample: 1342

- 523 women & 819 men (296 more men than women. In order to ensure a balanced sample between men and women we randomly selected 523 men out of 819 to achieve a total sample of 1046.

Source: Busara data analytics for Arifu, 2020

About Arifu

Arifu Overview

The Arifu Model

- Arifu's platform is a free, interactive chatbot that provides a familiar, personalized way to learn skills, discover products and earn rewards
- The platform is accessible on any type of phone, allowing farmers to access learning content conveniently
- Arifu's vision is to provide easy access to information and opportunity within everyone's reach.

Overview of Arifu services

Content design

- Arifu develops custom, interactive, educational content for partners' learners on topics such as agriculture, energy, financial, telecommunications and humanitarian spaces.

Content delivery

- Learners can access learning content – both custom content and content already on Arifu's library – through the Arifu platform mostly via SMS

Data analytics

- Arifu measures learning interactions and outcomes to help partners and learners improve and grow.

In agriculture, learning modules cover topics such as:

- **Value chains**: Poultry, dairy, rice, maize, livestock, potato, cabbage, tomato, indigenous vegetables
- **Modules**: selecting seed varieties, land preparation, transplanting, crop protection, harvest, storage, etc.

Source: Arifu pitch deck, 2020

Farmer Engagement Journey

Usage Overview

In this section, we presented the overview of who are using Arifu and how have the learning modules provided by Arifu have been used.

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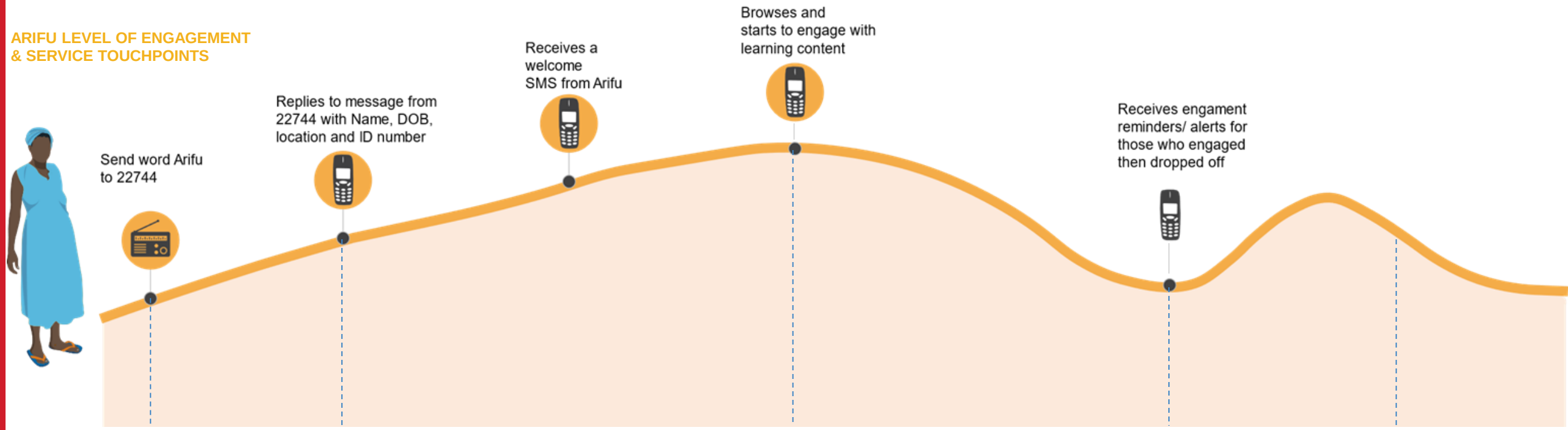
Engagement Journey of Women

	AWARENESS	FIRST ACCESS	ENGAGEMENT	MIGRATE DOWN	MIGRATE UP
Arifu Product journey	AWARENESS	ONBOARDING	PRODUCT USE	ADVANCEMENT	
Woman Farmer's journey	Learns about Arifu from mass media and SMS from Arifu	Sends a message to Arifu or responds to SMS prompt	Registers to the Arifu service	Selects learning module based on value chain of interest	Continues learning and engaging with the learning modules	Receives weekly SMSs from Arifu to proceed with learning modules	Engages with additional learning modules that may not be specific to their current value chain

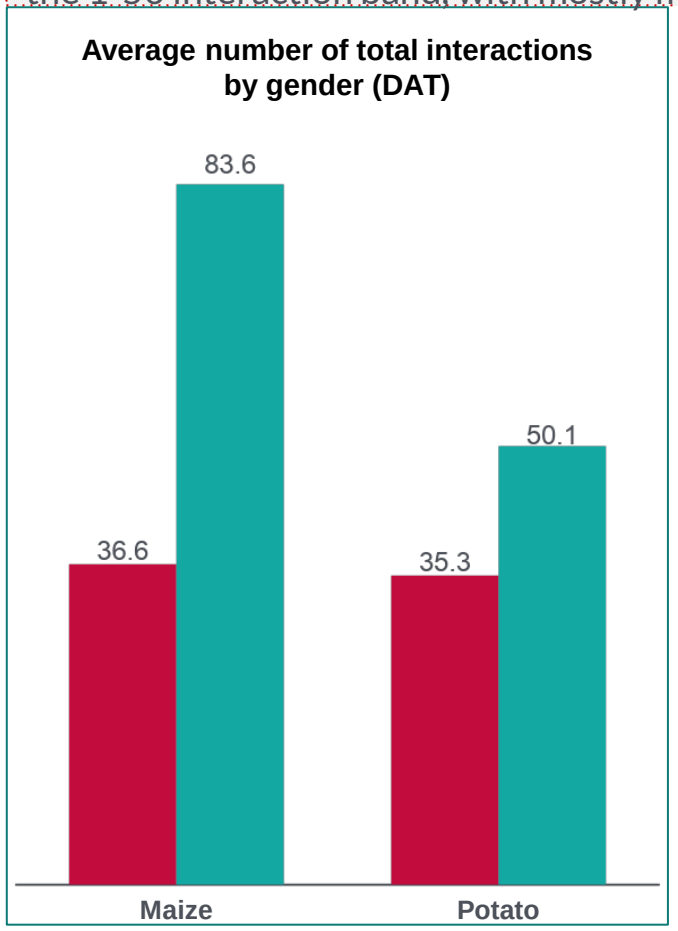
ARIFU LEVEL OF ENGAGEMENT & SERVICE TOUCHPOINTS

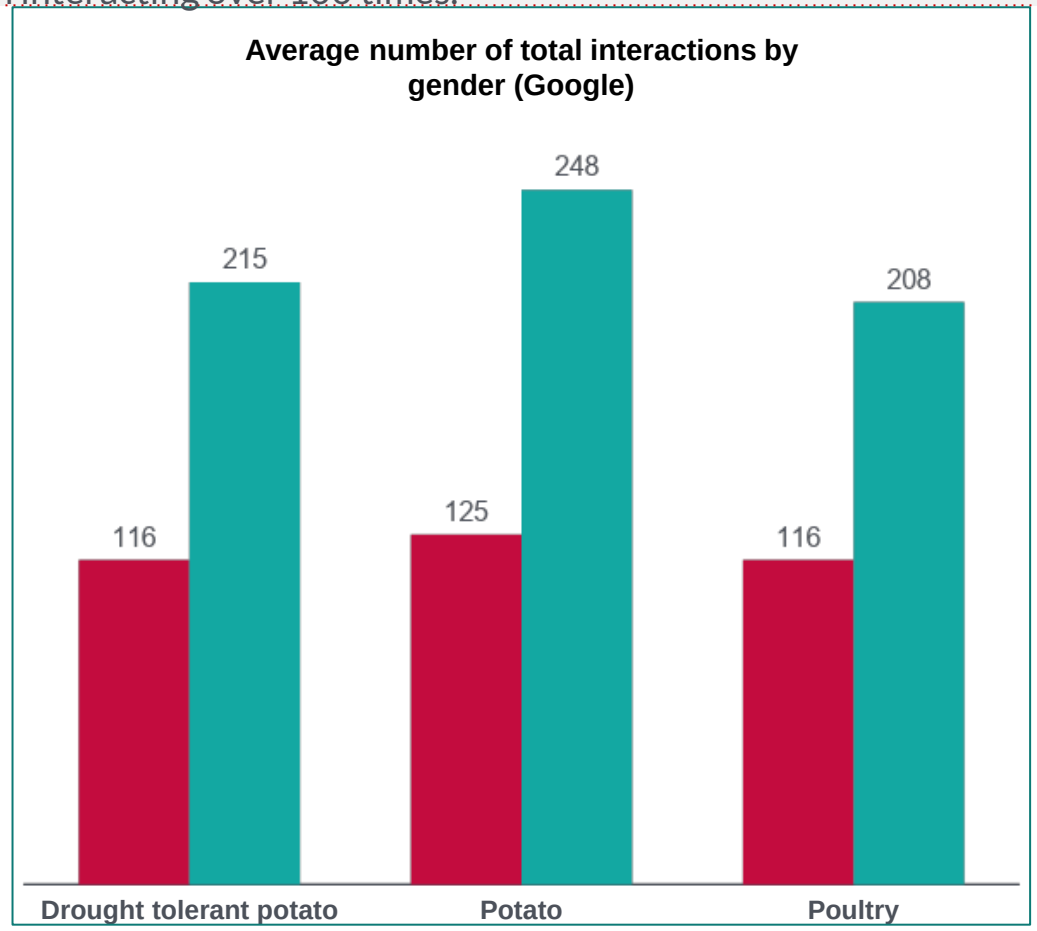


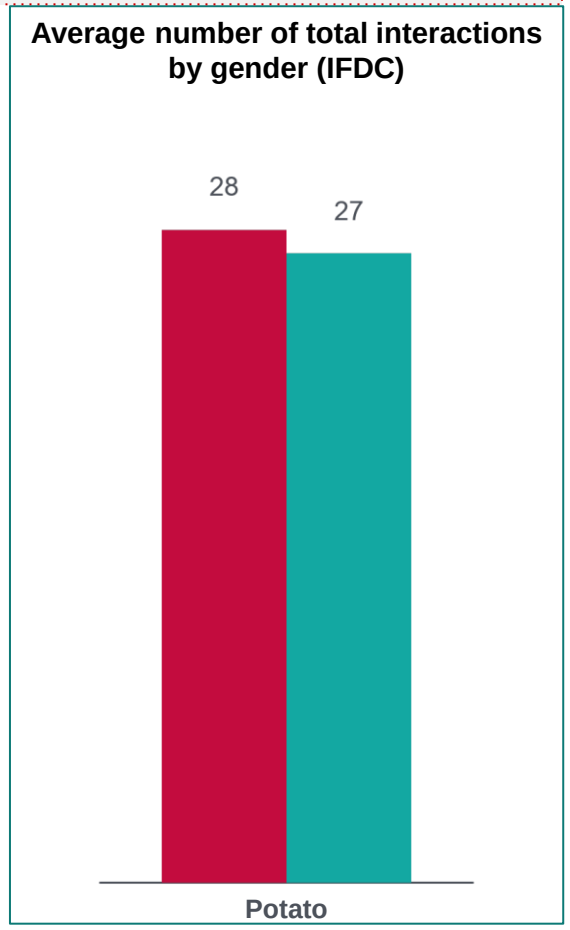
Woman Farmer's Questions	• What is Arifu? • Who do I talk to to learn more? • Is it a scam?	• Should I respond to the SMS? • How will Arifu help me? • How do I register? • What kind of information will Arifu require from me? • Is there an agent to help me register?	• What content is available on Arifu? • How do I access this content? • What content is most important to me? • How much time will it take for me to finish the lessons? • How can I plan my day to make time for the lessons with all my household responsibilities?	• How often should I interact with the content? • When should I expect the next SMS?	• How/where can I access additional products / services? • What are the benefits of the additional products / services? • Who do I refer this service to?

User Interactions with Learning Programs by User Value Chain

Interaction with learning content is defined as the training messages pulled via SMS by users. Users can engage with a particular learning program repeatedly. On average, men engage with Arifu modules more than women except for IFDC modules, where women interact with the module slightly more than men. Interactions can be further categorised into bands (1-50, 50-100 and over 100). Over 70% of users where in the 1-50 interaction band, with mostly men interacting over 100 times.



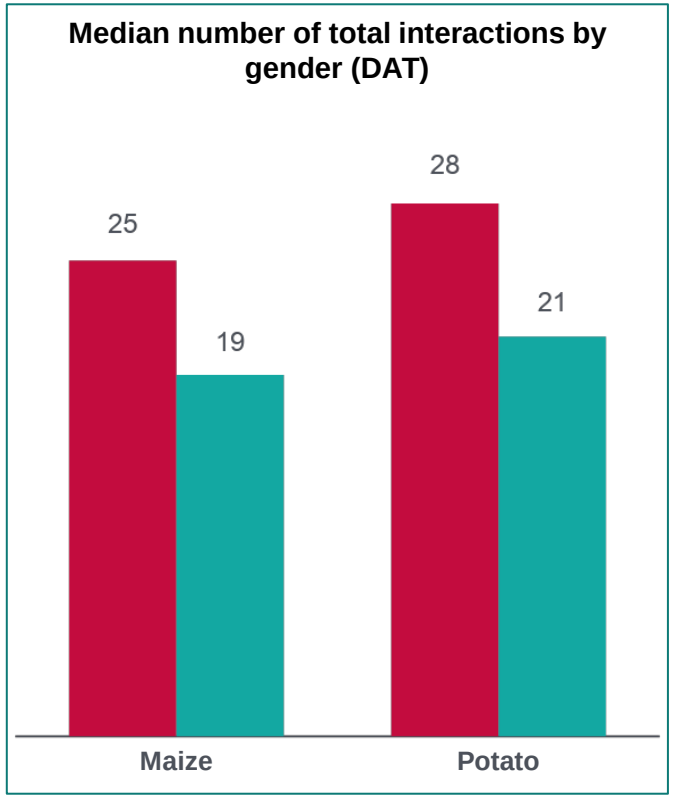


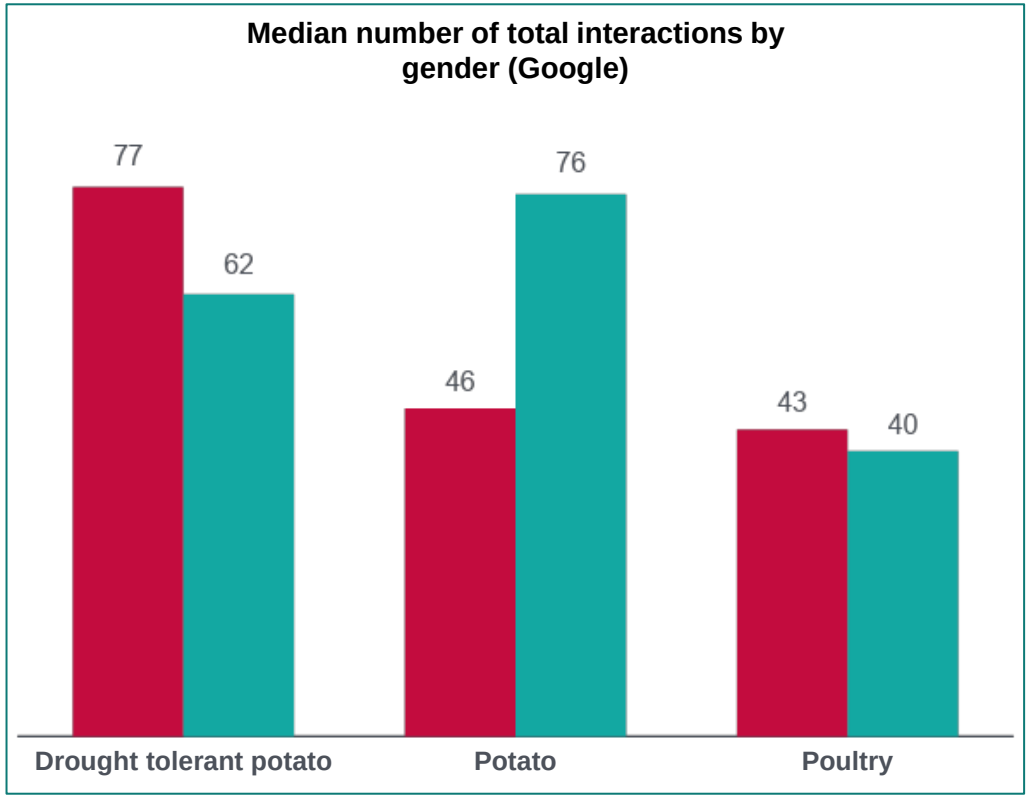


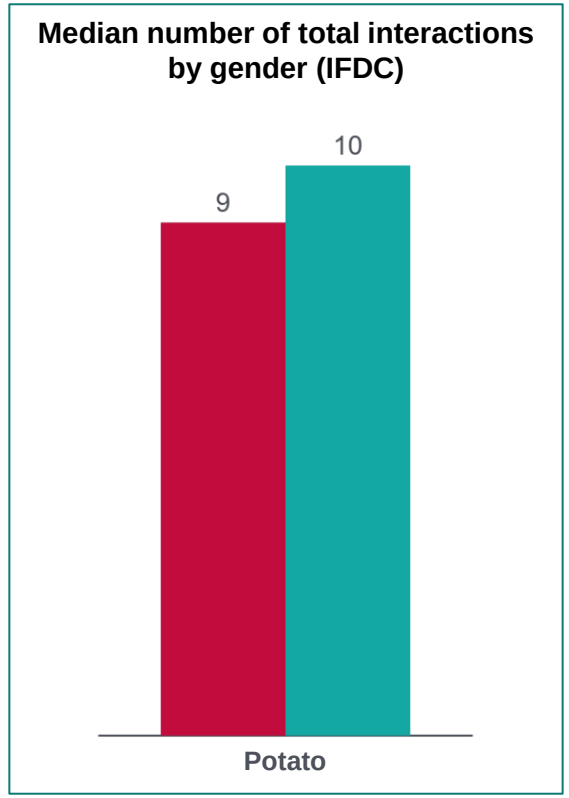
Key: Women, Men

Source: Busara data analytics for Arifu, 2020

User Interactions with Learning Programs by User Value Chain







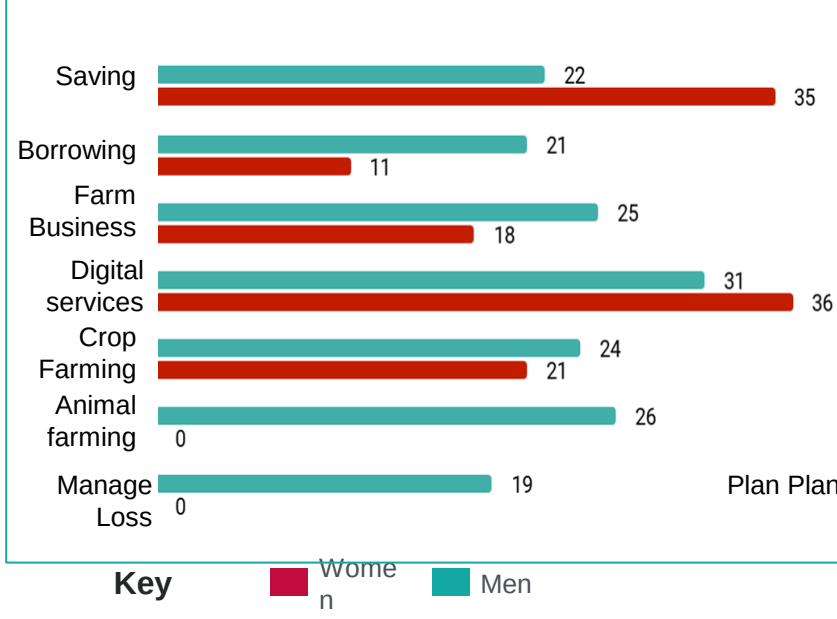
Key Women Men

However, women's median interactions are more than men's across most modules except Google's potato and IFDC potato modules. This indicates that the higher average of men interacting with modules compared to women is likely driven by a few male users who are extremely active. This indicates that men are more likely to be high-frequency users (superusers) than women, while there are more consistent users among women.

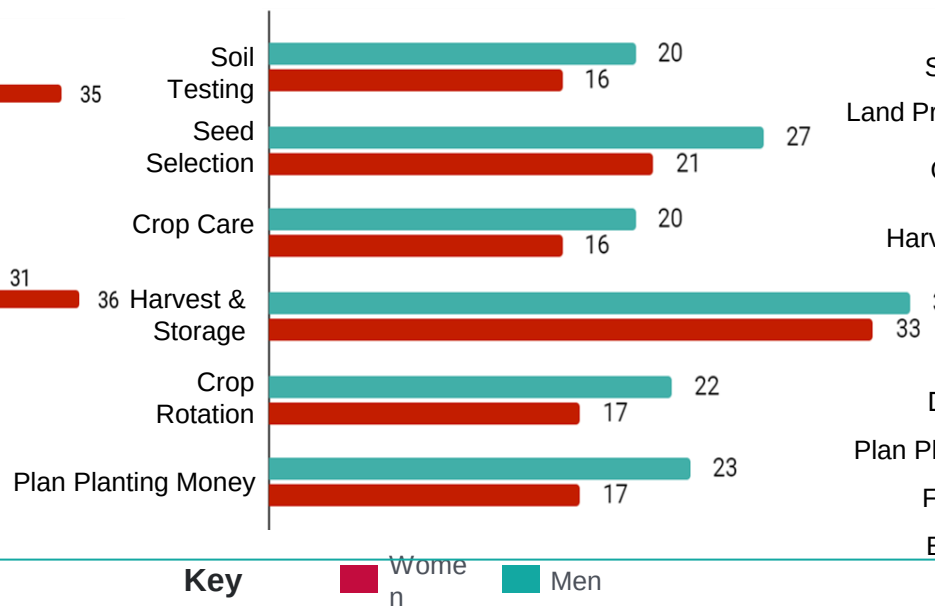
Source: Busara data analytics for Arifu, 2020

User Interactions by Partner and User Value Chain

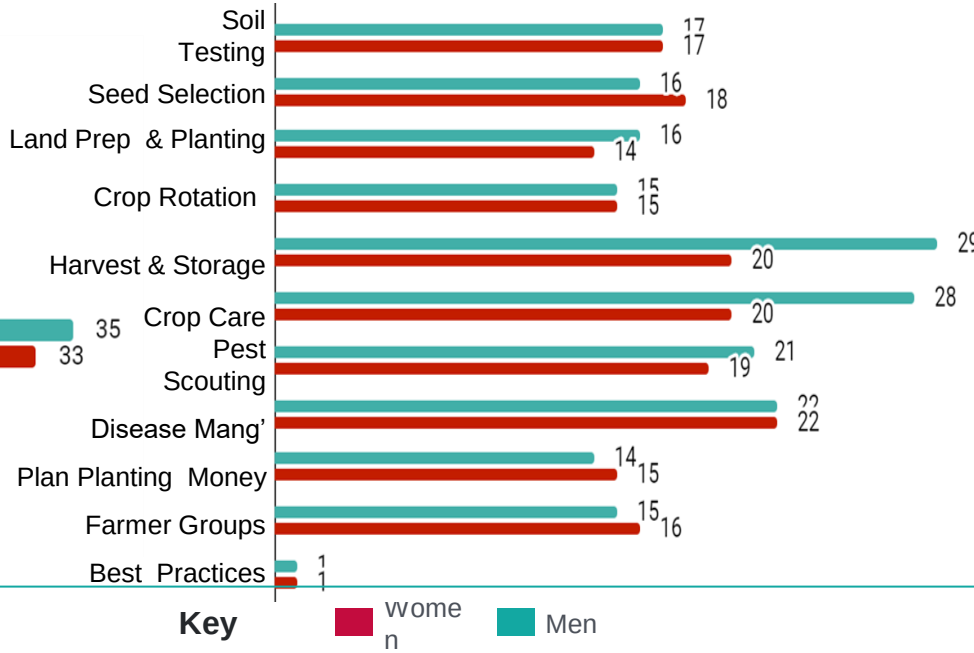
Average interactions per gender, Potato Value Chain (DAT)



Average interactions per gender, Potato Value Chain (Google)



Average interactions per gender, Potato Value Chain (IFDC)



Women had higher levels of interaction than men in stand alone saving related learning programs and saving related programs under digital services. However we see much fewer women interact with learning about borrowing possibly indicating more aversion to credit compared to men. We see no interaction for women with animal farming and managerial programs such as managing losses.

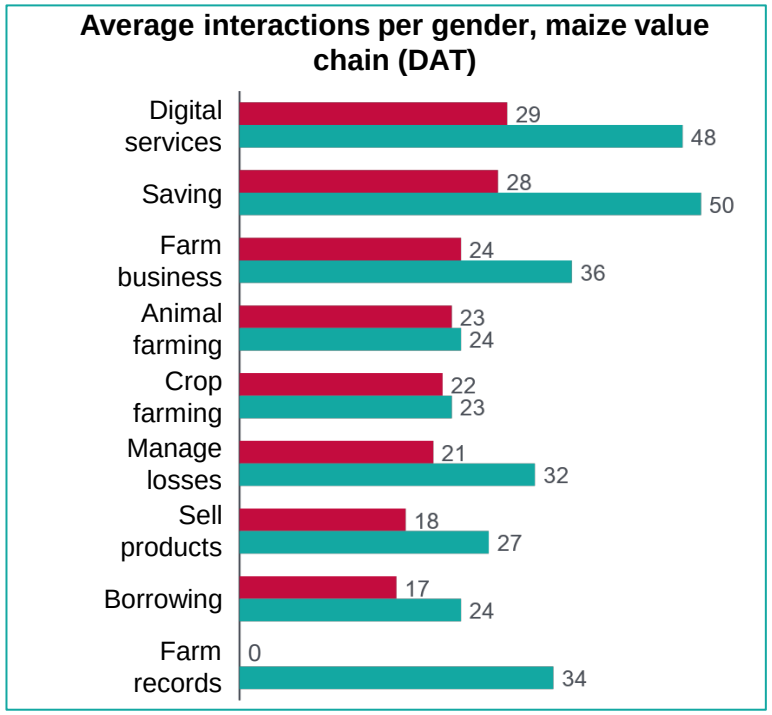
Both men and women have high levels of engagement in harvest and storage modules, followed by seed selection. However interaction by men in other pre-planting/planting learning modules such as crop rotation and soil testing was higher than women for the Google sample.

Women engaged most in disease management, harvest & storage as well as crop care learning programs. In contrast to the interaction in the Google sample, we see more women engaging with seed selection modules compared to men. Women also interacted with learning programs pertaining to farm groups more than men.

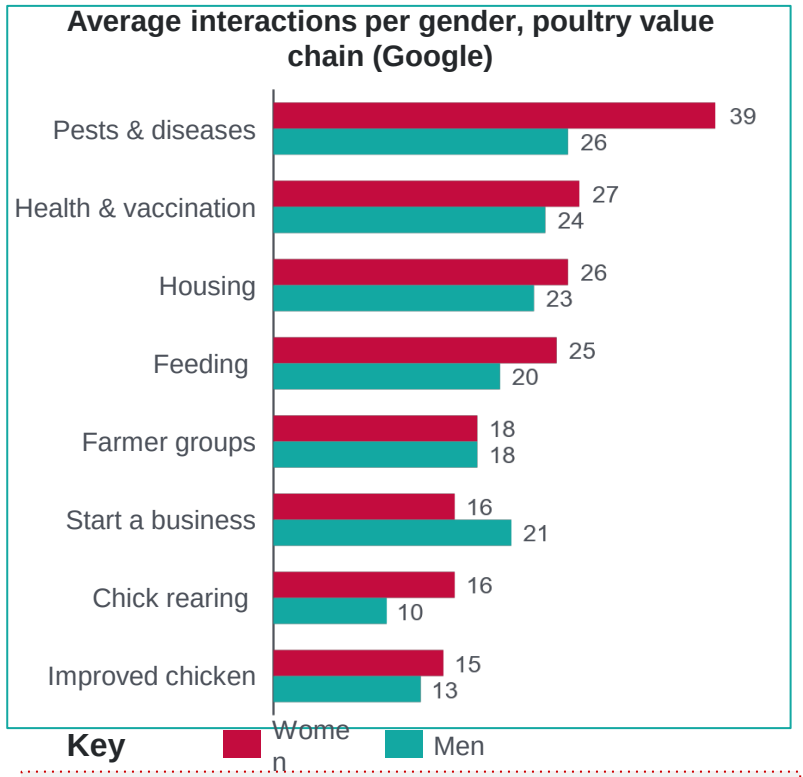
Source: Busara data analytics for Arifu, 2020

User Interactions by Partner and User Value Chain

Women had higher average interactions than men with most Google poultry modules



Men recorded higher average interactions than women across all modules. However, the interactions for men and women are almost similar for crop and animal farming. Women have no engagement with managerial program on farm records and relatively lower engagement with other non crop or farming modules such as selling products



Women recorded higher or similar interactions to men across all poultry modules except in starting a business. This is likely because of women's higher involvement in the poultry value chain, and therefore engagement. Google also deliberately prioritized reaching out to women due to their high involvement in the poultry value chain.

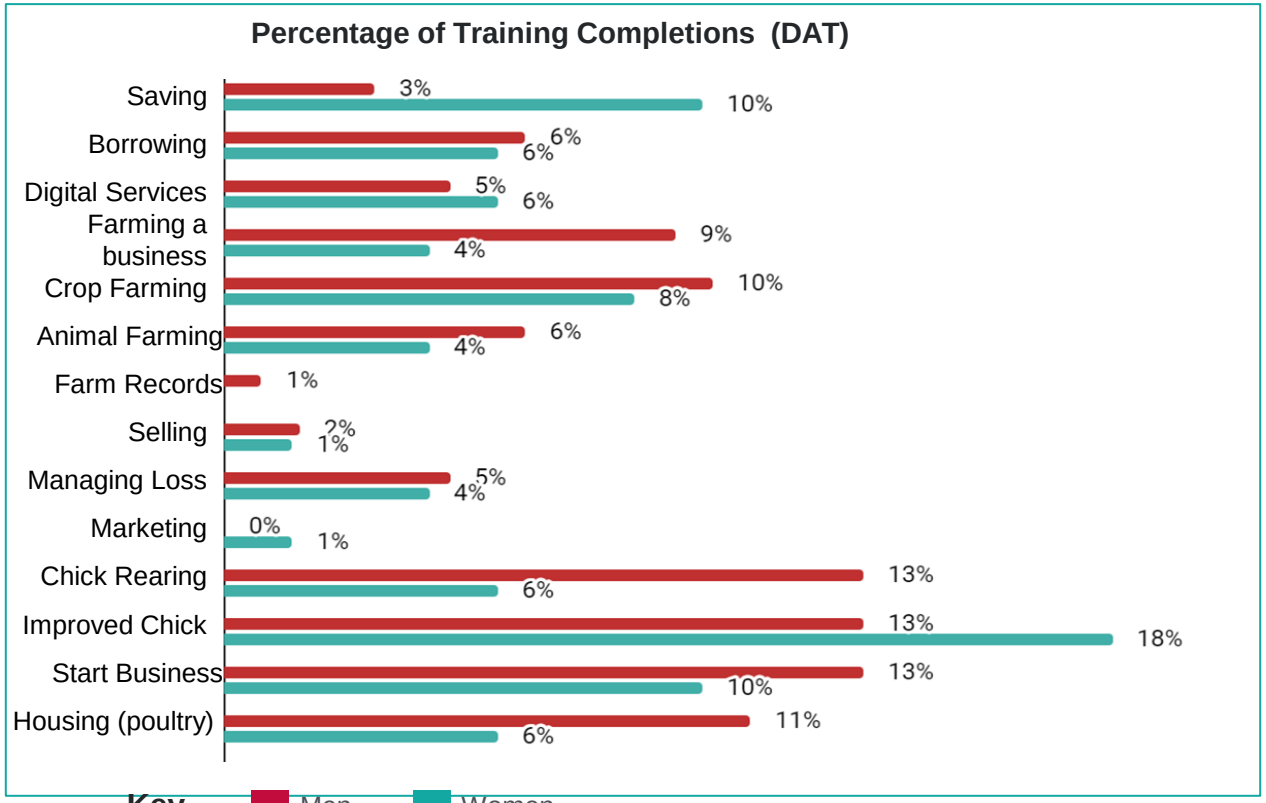
The drought tolerant potato value chain under the Google sample had much fewer users compared to the potato and maize value chains.

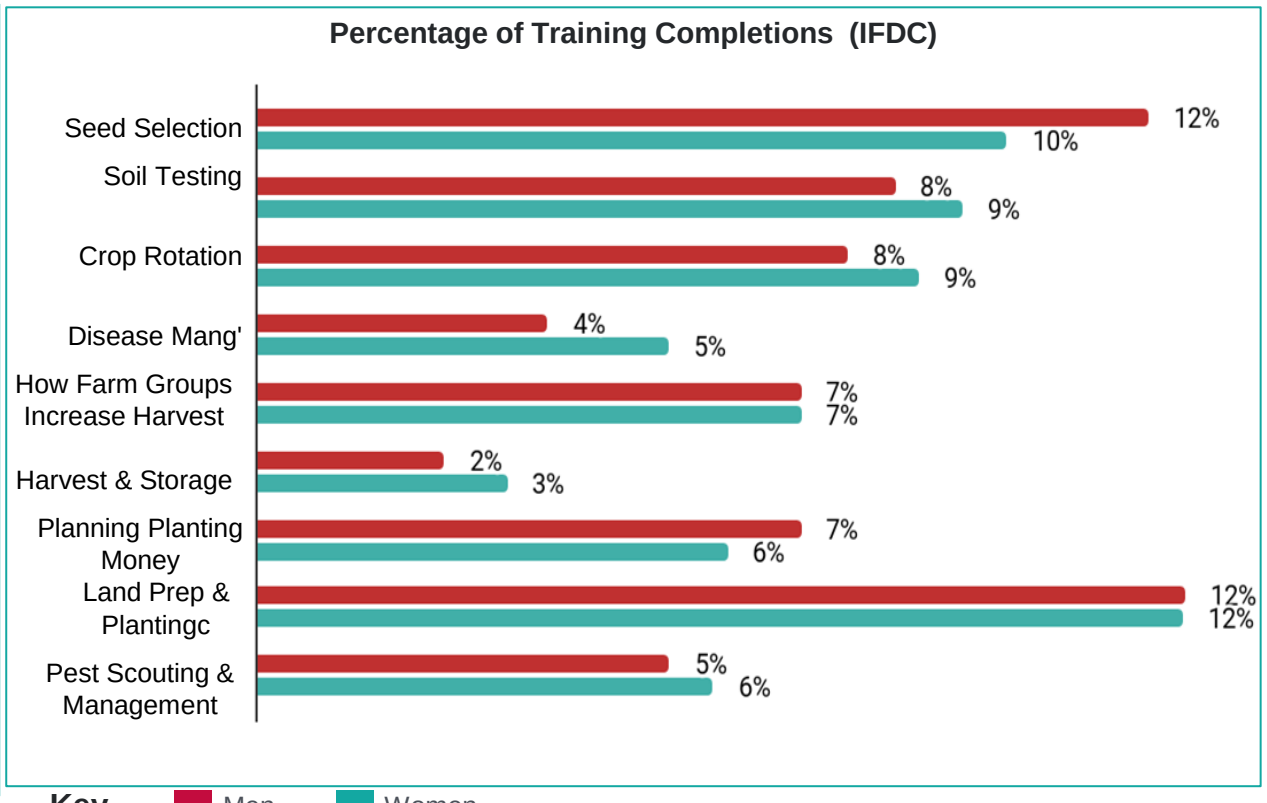
However when we look at the median interactions we find more active women users (under the drought tolerant value chain)

However women interacted less in managerial learning programs such as crop protection, weed and nutrient management compared to men.

Source: Busara data analytics for Arifu, 2020

Training Completion Rates by Partner and Learning Program



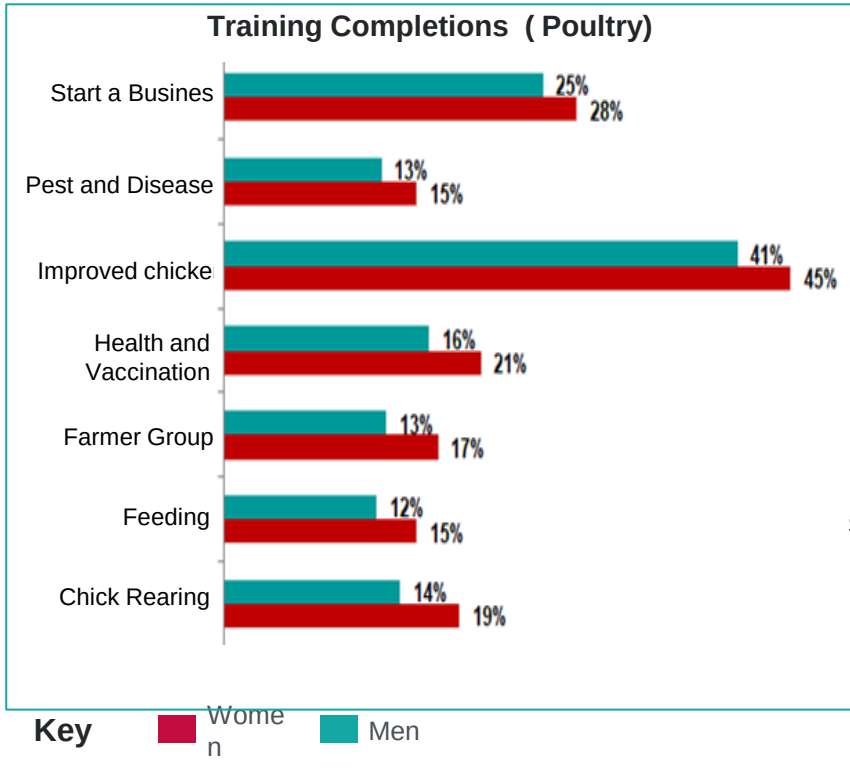


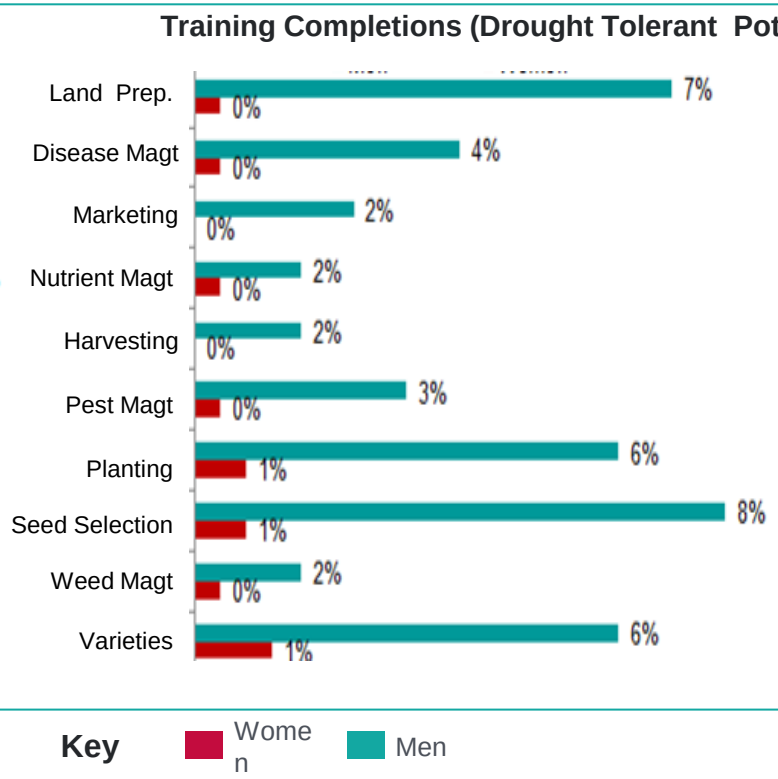
Completion rates range from 0-18% and were higher for men across all learning programs except for saving and chick rearing, which may signify gendered roles in poultry compared to any other value chain. However completion rates for poultry modules were relatively higher for both men and women compared to most other learning programs. We observed that the average duration in which men and women accessed learning content under DAT was approximately 2 days with an engagement spread of 1-5 days for most men and women. Women engaged with content mostly on Saturday evening while men engaged more with content on Friday evening.

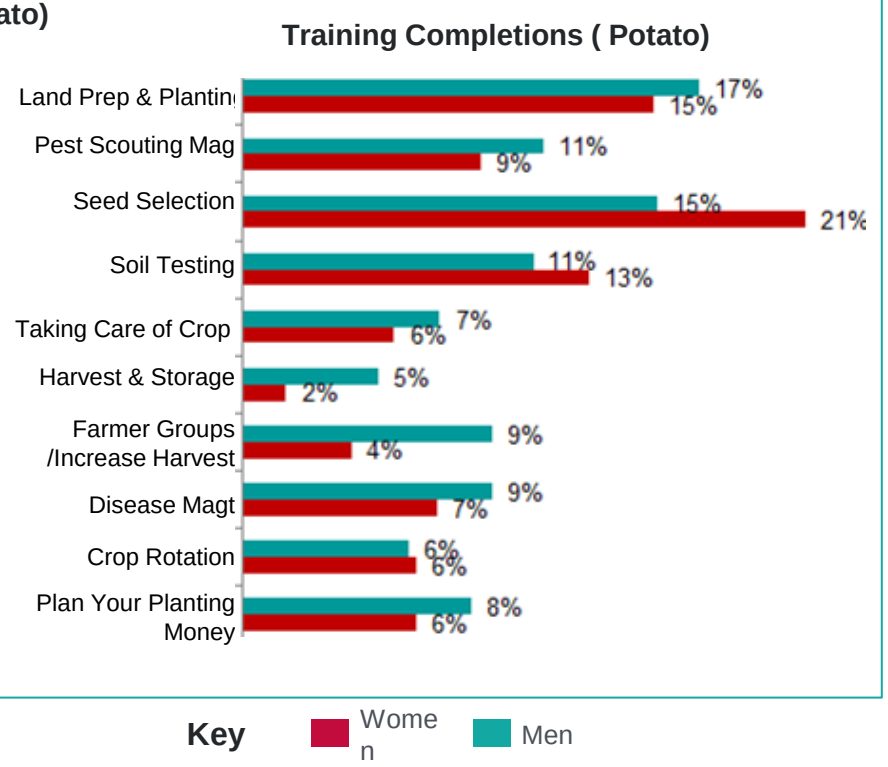
Completion rates are range from 2-20% slightly better than the range of completion rates under the DAT sample. The disparities in completion rates between men and women are low with women completing core planting modules like seed selection and land preparation at higher rates than managerial programs like disease and pest management. Men and women interacted with learning content mostly on Friday evenings. The average number of days modules were accessed was roughly 2.

Source: Busara data analytics for Arifu, 2020

Training Completion Rates by Partner and Learning Program: Google





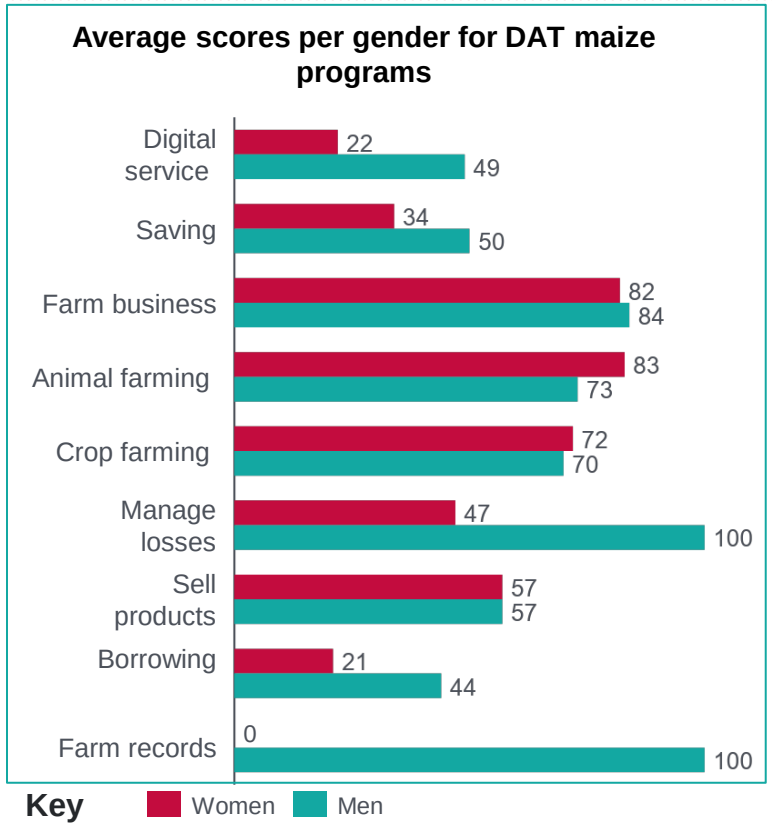


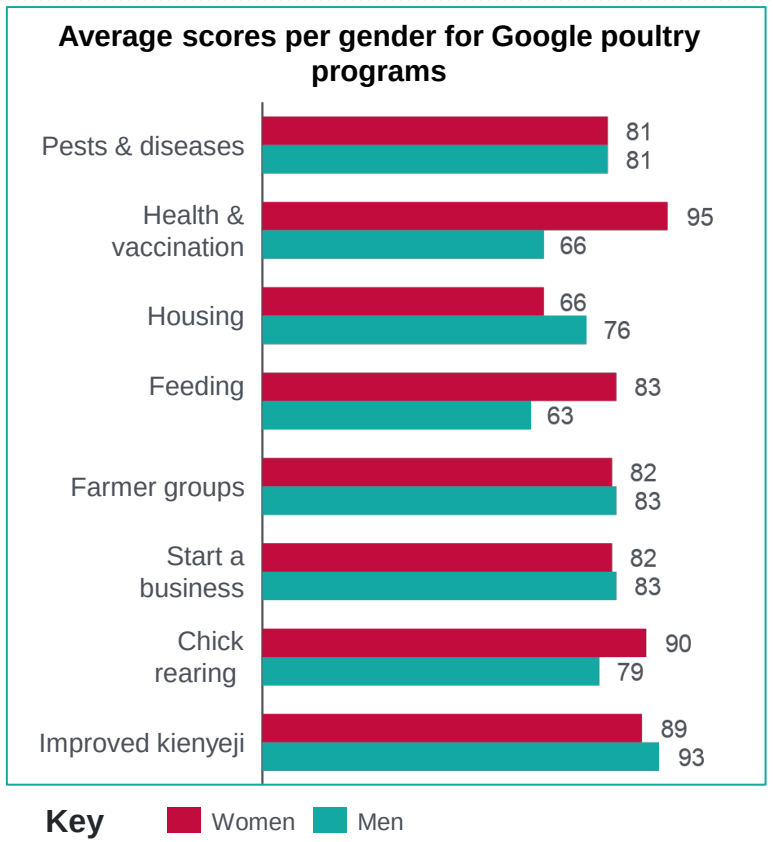
The poultry value chain had the highest levels of training completion of all Google value chains. Women out performed men in training completions for all poultry modules and achieved the best completion rate across all partner learning programs in the improved chicken program. Women also demonstrated better completion rates in some potato value chain modules such as seed selection and soil testing. We observed relatively lower completion rates in the drought tolerant potato value chain Men and women interacted with learning content mostly on weekdays (women on Wednesdays and men on Fridays). The average days content was accessed was approximately 3 for women and 4 for men, however the full spread in engagement was similar to most other partner samples and mostly within 1-6 days.

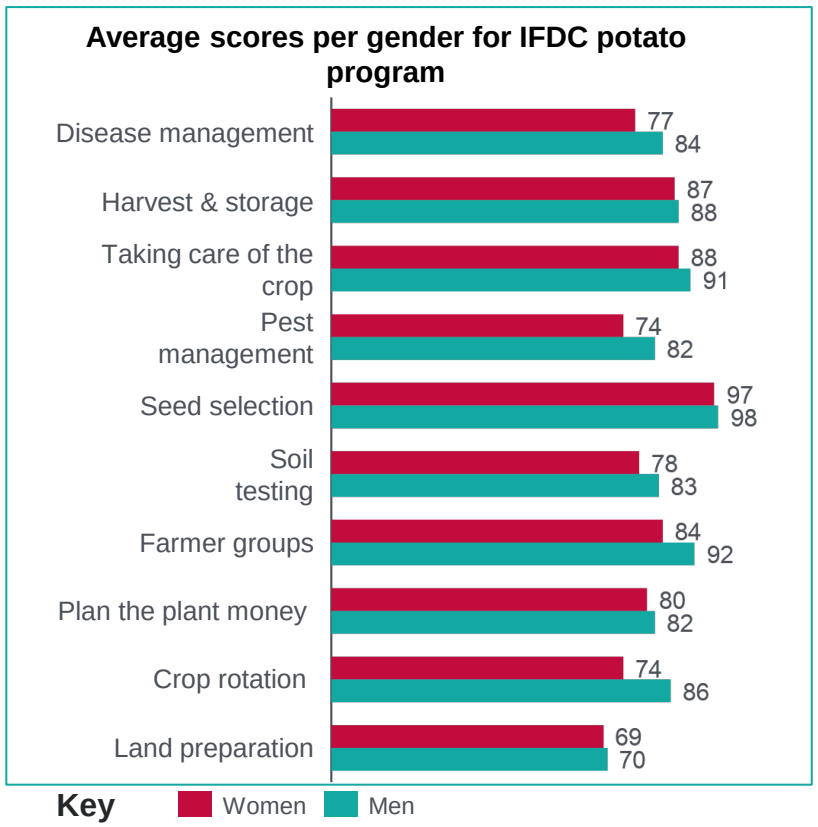
Source: Busara data analytics for Arifu, 2020

Knowledge Scores by Most Common Value Chain

Users have the option to participate in training quizzes to assess their understanding of learning at completion. Women out performed men in crop and animal farming under DAT and had higher or almost-similar scores to men in most poultry modules under Google. Given the low completion rates in the DTP value chain we see less women achieving knowledge scores. The scores below are for the 3 most prominent value chains based on completion rates (potato, maize and poultry).







Women out performed men in crop and animal farming likely because women undertake these activities more than the others. Women scored lower than men in managerial programs on managing loss and did not achieve any scores for farm record keeping.

Women outperform men or have almost similar scores across all poultry modules except in housing and improved kienyeji. This is likely because of women's high involvement in the poultry value chain and more robust levels of interactions with these programs.

Knowledge scores are above 70% for most IFDC potato programs, significantly better than the scores under the DAT potato value chain. Men score better than women in all modules under the IFDC. However, the gap is less between genders in seed selection, and land preparation, which are areas that women are highly involved in in farming.

Source: Busara data analytics for Arifu, 2020

User Engagement across Partners and Learning Programs

Interactions

Across all partners both men and women accessed content mostly on weekdays (Friday),with the exception of Saturdays for women in the DAT sample. The full spread of engagement duration for all users was wider for men across all partners particularly men under IFDC(1-46 days). However, most men and women (over 70%) typically engaged with programs over 1-5 days, with the average days accessed being 2-4 for men and 2-3 for women.

Over 70% of both men and women fall within the low interaction band of 1-50 interactions with the exception of users in the Google sample who have more users that interact multiple times with learning content up to 400 times. We observe Google sample with more users interacting with learning programs over 100 times.

Women interacted more with core pre-planting/planting programs across partners, which is true for potato, maize and drought tolerant potato value chains. Women engaged better with drought tolerant potato programs under the Google sample compared to the DAT sample. Median interactions reveal more women engaged with learning content especially under the potato value chain under the DAT sample than maize or the IFDC potato farmers. In addition, women engaged relatively less with management programs such as weed management and nutrient management across all partners.

Women also showed great interest in learning about farm groups under the poultry programs (women showed little interest in farm group programs associated with harvesting offered under IFDC for the potato value chain). We observed some of the highest levels of interaction by women was with poultry programs under in the Google sample, especially for the improved chicken program, despite the fewer number of overall women users compared to men interacting with the poultry menu. The saving and borrowing programs were also popular among women compared to other programs under the DAT maize and potato programs, but more pronounced for women under the maize value chain.

Source: Busara data analytics for Arifu, 2020

User Engagement across Partners and Learning Programs

Knowledge Scores

Similar to the trends we observed in interactions across learning programs and completion rates, women obtained higher knowledge scores in most poultry learning programs compared to programs under drought tolerant potato, maize and potato. For users under the DAT sample, we observed that, despite of high interactions with the borrowing, saving and planting programs for both maize and potato value chains knowledge scores were quite low relative to other learning programs. This may indicate the need for more robust learning content especially around credit given the interest shown by users.

Women did not obtain a knowledge score for most management and administrative programs such as farm records under the DAT menu and weed management and nutrient management (with the exception of disease and pest management) under the Google sample. This may indicate low demand to validate knowledge for these types of programs. In contrast, we observe not only did women obtain knowledge score in programs like seed selection, soil testing, land preparation, saving but they also achieved fairly high scores compared to post planting programs like harvesting and storage.

Overall collective average knowledge scores for women was highest for poultry learning programs (over 80%) and lowest for drought tolerant potato (approximately 69%). Women's knowledge scores were very similar to men across the IFDC and Google Potato learning modules with an average knowledge score of roughly 77%.

Completion Rates

Completion rates was low in most of the learning programs across all partners (below 22%) with the exception of poultry programs under the Google sample, where we observed the highest completion rate of 45% by women (41% for men) for the improved chicken program. Consistent with the trend of high interactions with poultry programs seen among women, completion rates of women were also higher than men for all poultry programs under the Google menus and a few under the DAT menu.

Completion rates under the drought tolerant potato value chain was the least particularly for women with average completion rates below 5%. This was especially for the management programs (e.g. weed management and nutrient management). Completion rates were relatively better for women interacting with planting/pre-planting programs such as seed selection, soil testing, crop rotation and land preparation across all value chains for all partners. Overall complet

Factors that Influence Awareness and Adoption

In this section, we analyzed the data and information from farmer interviews and identified factors that influence awareness and adoption of Arifu particularly among women users.

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Factors that Drive Awareness and Adoption Among Women

SMS Channels

Most women users, similar to men users, learn about Arifu through SMS sent by Arifu on behalf of partner platforms; however, a small number of more savvy users reported learning of Arifu from mass media and the internet (Google and social media). High-frequency users are typically tech-savvy and therefore might come across Arifu on the internet and look for how to register once they are aware. Low frequency users are more likely to be less tech-savvy and therefore more likely to have SMS as the primary channel of awareness.

"I heard (of Arifu) from the radio (Chamgei FM) and I registered by pressing 22744"

WOMAN| FARMER | 36 | KERICHO

Simple Registration Process

Once aware, the decision-making process for women to register is short – there is limited consultation with partners /husbands or others on whether to register. Women farmers indicate that only cell phone ownership is required to register, which lowers the need to consult their husbands or others before joining. Learning content is also free (doesn't require payment) which results in women perceiving it as a low-risk product to use and therefore little consultation is needed for them to use the product.

Both women and men farmers indicated that they find the process intuitive, with few steps to follow which encourages them to sign up. However, **limited clarity on how to register on Arifu's website** could also be limiting the ability of some farmers to register. A small number of farmers (both women and men) indicated that they were unable to find the registration code and process on Arifu's website and this prevented them from being able to join the platform earlier. This was mostly a barrier for farmers who came across Arifu through other channels e.g., mass media

"When I saw the message, I did not ignore it and I followed instructions until I knew if the information was beneficial to me. I did not ask anyone before joining."

WOMAN| FARMER | 38 | MURANG'A

Source: Dalberg analysis, Arifu farmer Interviews, 2020

Factors that Drive Awareness and Adoption Among Women

Learning Specificity

Women farmers join Arifu in search of more and specific information on the value chains they are engaged in. Despite having other channels of information, women indicate they still joined Arifu as they would like to have even more information on their value chains, and to see if Arifu would have specific and context-relevant information on their value chains, which other platforms may not have.

Personalized Communication

The personalized welcome message that new users receive from Arifu upon registration makes farmers feel welcomed, appreciated and secure. This is more impactful for women farmers, who often require additional persuasion to establish trust for digital products and services compared to men. Women farmers mentioned feeling acknowledged and recognized after registering, which encouraged them to explore the platform further after registration.

"The (registration) process was simple and easy to follow. They asked me questions about my name, ID, county, and what I was farming."

WOMAN| FARMER | 24 | KERICHO

"I would like an agent to come on the ground. Lots of people would like to hear from the horse's mouth. Some in my group would have registered."

WOMAN| FARMER | 39 | NYANDARUA

Source: Dalberg analysis, Arifu farmer Interviews, 2020

Factors that Limit Awareness and Adoption Among Women

Low Brand Recognition (Trust)

Low brand recognition of Arifu and recent high rates of scams through SMS inhibit uptake of Arifu. Some women farmers, particularly low users, indicated that they did not want to reply to the Arifu message as they were unsure if the messages were genuine. This is partially driven by low brand recognition of Arifu - most women users interviewed indicated they had not heard of Arifu prior to receiving the message. This was mostly the case where Arifu sent the invitation SMS to potential learners on behalf of its partners, without the partner's name being mentioned. Women also have lower trust levels on average compared to men and are therefore more likely to be suspicious of SMS from an unknown source.

"I saw the message and thought it was a scam, the message had my name, but I did not trust it."
WOMAN| FARMER | 42 | NAROK

Limited Peer Referrals

There is limited peer-to-peer sharing about Arifu, especially during initial use. This could be because learning programs are not a physical product, resulting in women farmers being unable to showcase the product and share with peers. Most female farmers wait until they can witness the impact Arifu knowledge will have on their farms before sharing with peers. Women farmers also indicate they rarely share because they are not sure if their peers will have an interest.

"I have not yet shared with my friends. I wanted to know if it is working first so when I share, I can say it is working and show (them) how I have benefitted from Arifu – it is easier to convince when they can see the benefits."
WOMAN| FARMER | 27 |NYANDARUA

Absence of Interpersonal Touch Points

Lack of on-the-ground agents, and limited involvement of partner agents in onboarding women may discourage less digital-savvy women farmers from joining. Compared to their male colleagues, less digital-savvy women farmers indicate that they would prefer to have a community-level contact to assist them with questions and directions when signing-up

"The message I received was very helpful, it made me feel happy and I wanted to continue."
WOMAN| FARMER | 36 | KERICHO

Source: Dalberg analysis, Arifu farmer Interviews, 2020

Factors that Influence Product Use/Engagement

In this section, we analyzed the data and information from farmer interviews and identified factors that influence the usage and level of engagement of Arifu, particularly among women users.

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Factors that Drive Engagement Among Women

Initial Engagement

Newness to Arifu is a key driver of engagement with learning content. Both women and men farmers engage with Arifu much more frequently at the beginning as they familiarize themselves with the content on Arifu, however, once the programs of interest are exhausted, usage tapers off for mid and low users.

Curiosity

High-frequency users (both women and men) exhibit higher levels of curiosity about the programs offered and explore the platform more, unlike low-mid users. This is partially driven by higher levels of digital savviness among high-frequency users, but also traits of curiosity and openness to learning about new things. Low-mid users indicated lower levels of curiosity and self-initiative to explore the platform.

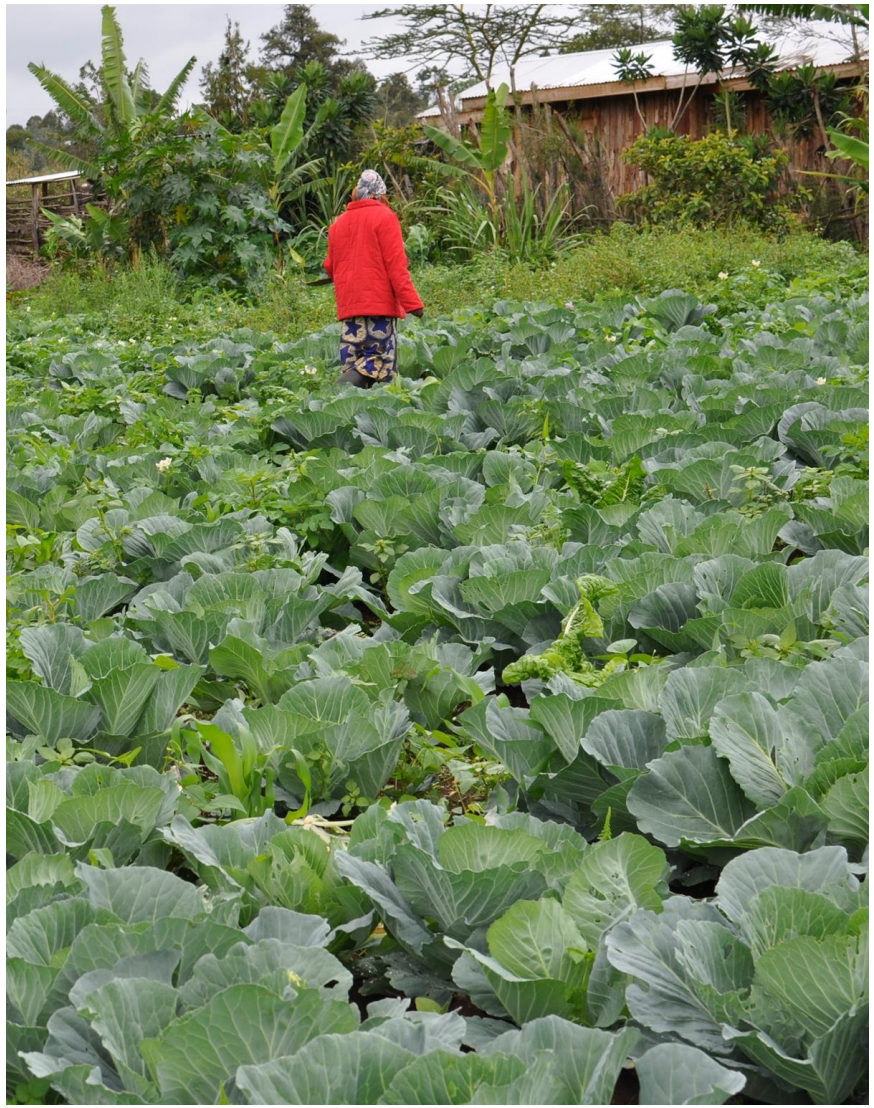
Availability

Time availability is also a key driver of usage, resulting in men being more likely to be high-frequency users than women. Both men and women farmers mentioned being busy, which limits their use of Arifu, however, women farmers reported being more time-constrained. Social norms, which often require women to undertake household chores in addition to childcare responsibilities result in higher time poverty for women. Women farmers interviewed indicated they often engaged with content in the evening while multitasking with house chores e.g., cooking. This could also be driving the lower knowledge scores for women, as they learn while multitasking.

"When I first registered, I tried to use daily. I would use it in the evening while making ugali."
WOMAN| FARMER | 36 | KERICHO

Source: Dalberg analysis, Arifu farmer Interviews, 2020

Factors that Limit Engagement Among Women



Limited Overview of Content Available

Lack of an onboarding message outlining all content available, i.e., all value chains available on the Arifu platform, results in a drop in usage when women users end engagement with initial learning content. Some women users indicated they are unaware of other programs once they finish lessons on their initial programs.

"I did not have an onboarding message. Now I am stuck because I finished the potato module and thought Arifu was only on potatoes."
WOMAN| FARMER | 39 | NYANDARUA

Lack of Follow Up

Lack of a follow-up message to re-engage users once they end use of initial content offering on Arifu is also contributing to low usage. Female farmers indicate that Arifu stops sending them messages after they end use of content on value chains of interest which contributed to their decreased engagement.

"I don't use it anymore because I no longer receive messages, I think I exhausted the questions on poultry."
WOMAN| FARMER | 27 | KERICHO

Source: Dalberg analysis, Arifu farmer Interviews, 2020

Factors that Limit Engagement Among Women

Gendered Roles

Gendered roles in agriculture limits the value of, and usage of some programs by women farmers. Some women farmers indicated that they only learn about specific modules in the value chain e.g., chick rearing in poultry or land preparation and planting as they (women) are the ones that primarily undertake these farm activities, which may limit engagement with other value chains / programs.

"Mostly women (are engaged in) poultry farming. Men see it as a woman's work. Poultry also requires you to be home all the time, but men (often) want to venture out and so cannot take care of the chicks."

WOMAN| FARMER | 24 |KERICHO

Source: Dalberg analysis, Arifu farmer Interviews, 2020

Factors that Limit Engagement Among Women

Alternative In-Person Training

Availability of related learning content from other platforms, particularly those that offer in-person, on the ground training can drive lower usage of Arifu. Women farmers, more than men farmers, indicated a strong preference for in-person trainings, as these offer interactive sessions and a chance to witness how to practically apply knowledge. This limits engagement with Arifu if trainings are available in the areas where users are located. However, Arifu is complementary with women farmers mentioning i) they find it convenient as they can study at home and at their own pace, ii) it has content that covers value chains that on-the ground agents do not cover in their trainings.

"Now another platform teaches us about farming on the ground, so I do not need Arifu."

WOMAN | FARMER | 36 | KERICHO

Technology Limitations

Storage and internet connectivity limitations of feature phones also lower usage among women users. Women farmers indicate that feature phones are unable to access links sent through Arifu messages and sometimes do not receive messages as their phones' message storage becomes full, hindering their ability to access lessons. Some indicated they had to delete messages received prior in order to receive additional messages. This also hampers their ability to revisit messages from Arifu to refresh their knowledge. This impacts women more as they are on average, more likely to have feature phones compared to men.

"Smartphones are better because feature phones have a limit in the number of messages it can store. I have to delete messages to receive new ones."

WOMAN | FARMER | 36 | KERICHO

Source: Dalberg analysis, Arifu farmer Interviews, 2020

Overall, farmers appreciate the depth and specificity of information on Arifu, relatable characters, easy-to-follow modules, and SMS reminders

The depth and specificity of information of Arifu's learning modules drives engagement by farmers. Both women and men farmers indicate that they prefer Arifu content compared to other platforms e.g. Google, as Arifu content is more specific, context-relevant, and contains in-depth information on a centralized platform.

The use of characters and a story-centered content design encourages usage as both male and female farmers indicate that it helps them contextualize the programs and makes content relatable. The gender of the character also has little impact on usage for both male and female farmers who indicate that they are more interested in the content.

Women farmers also indicate that learning program designs are **easy to follow and use non-technical, easy-to-understand language, and are delivered in both English and Kiswahili** which encourages their continued usage. Women farmers likely appreciate this more as on average, they have lower digital literacy levels compared to men.

SMS prompts to engage with content is also a key driver of engagement, particularly for time-constrained women farmers. Women farmers indicate they are often strained for time, compared to men, and therefore appreciate the SMS prompt as it reminds them to continue their lessons. However, high-frequency women users tend to be self-starters who take initiative and follow up on lessons even when they have not received SMS.

"I like the content design (and the use of characters) because it helps me understand the process and I can relate to the farmer (character)."
WOMAN| FARMER | 24 | KERICHO

"The (use) of characters encouraged me. It made me feel I can also do it."
WOMAN| FARMER | 50 | NYANDARUA

"I used to receive SMSs twice a week, the reminders made me happy as I am busy. However, sometimes, I took personal initiative and studied on my own when I had time even if I had not received the message."
WOMAN| FARMER | 24 | KERICHO

Source: Dalberg analysis, Arifu farmer Interviews, 2020

Participation in multiple value chains and evidence of success drive farmers to learn about other programs; links to other products/services also drive continued use or advancement

Participation in more than one value chain and evidence of success drives progression to engage with content on other value chains by farmers. Women farmers, particularly high users, mentioned they start engaging with learning content of other value chains they participate in because of the positive impact (increased yields and/or productivity) they observe in their primary value chain, resulting from knowledge gained on the Arifu platform.

"I started with (modules in) maize, my yields increased, and I now know how to farm better. I then went ahead and used (modules) in poultry, and then beans."

WOMAN | | FARMER | 40 | BOMET

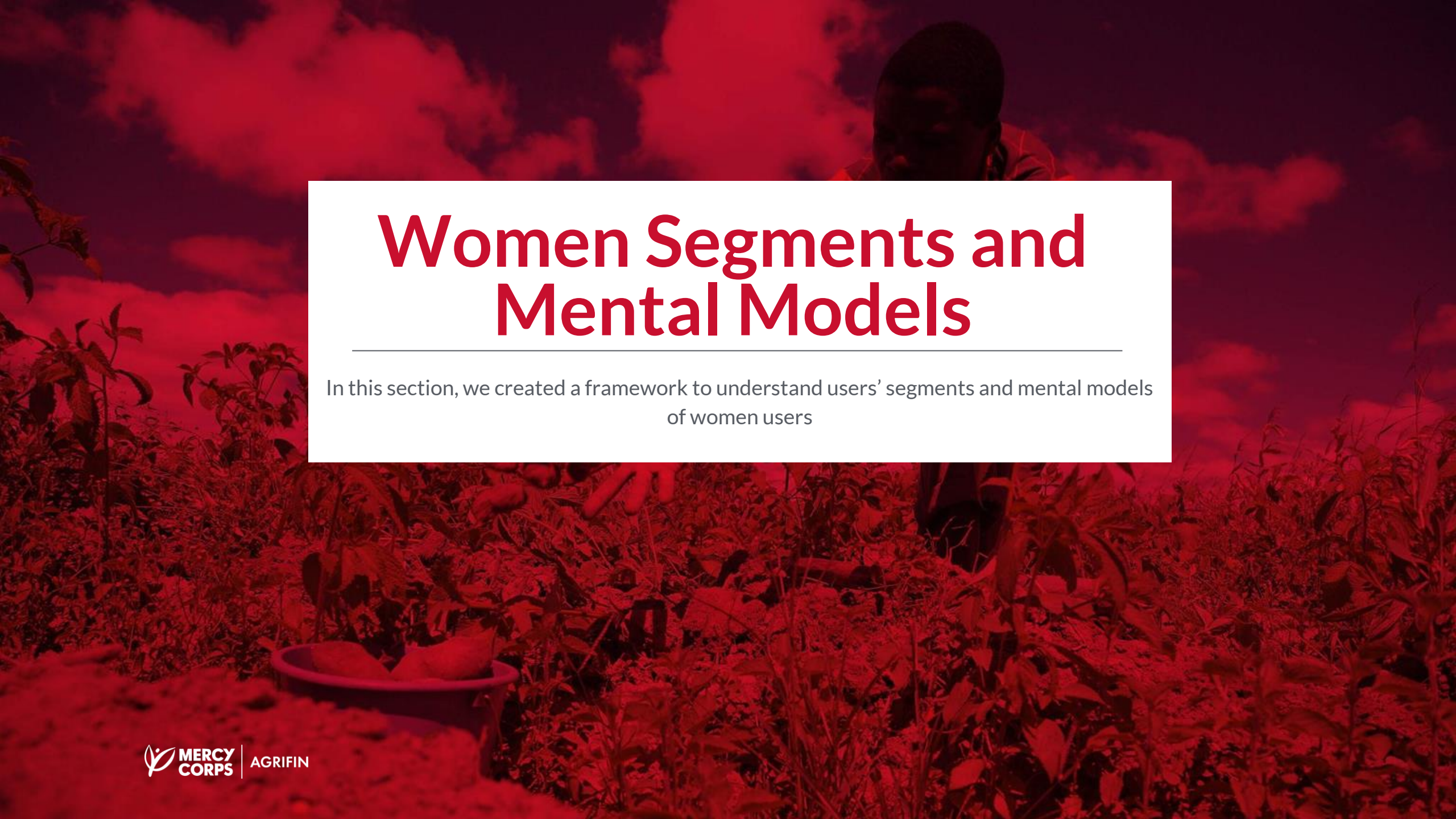
Some women farmers indicate that knowledge gained from Arifu has driven their uptake of new products and services e.g., loans to expand their current ventures. These female farmers indicate that knowledge gained from Arifu helped them gain confidence in their ability to invest and to service the loans successfully.

Limited knowledge on how to access certain services and products e.g., soil testing and certified inputs after learning of the services/products on Arifu can limit advancement. Some women farmers indicate that they would have liked to conduct soil testing but do not know how and where to access the services. Women farmers express that they would like Arifu to direct them on where to find some of the services and products mentioned in the content.

"I am thinking of doing soil testing, but I can't find someone to help."

WOMAN| FARMER | 40 | KERICHO

Source: Dalberg analysis, Arifu farmer Interviews, 2020



Women Segments and Mental Models

In this section, we created a framework to understand users' segments and mental models of women users

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Segments of Women and their Mental Models

Through the analysis of drivers and barriers to adoption/engagement, several segments of women users emerged, and some degree of insight into their psychometric traits was possible.

***We explored these beliefs and attributes further, to deepen our understanding** around drivers/barriers of product use by applying a mental models analytical framework to the emergent segments.*

*Through this framework we were able t**o distill some of the key beliefs, value propositions and cognitive biases that may be affecting decision-making** around adoption/engagement with products.*

Segmentation Methodology

We used four dimensions to segment and better understand women users on Arifu

DIGITAL USAGE PATTERNS

What are the usage patterns across the customer journey of Arifu *(a*wareness, onboarding, product use and advancement)?

High, average and low usage

DEMOGRAPHICS

What are the socioeconomic characteristics of women users that drive their usage patterns?

Age, location, marital status, education, digital literacy, livelihoods and household context

BEHAVIOR

What is the financial and social behavior of women users that drive their usage patterns?

How likely are women users to have a bank or mobile wallet account, save, borrow, budget, etc.? Which community activities do women users engage in that affect their usage patterns of Arifu?

PSYCHOLOGY*

Which are the psychometric traits that could explain women usage patterns on Arifu?

Women's sense of control, self efficacy, openness, trust, optimism, conscientiousness, and dependability

Note*: The Psychometric traits used are based on The Human Account of Kenya Women Smallholder Farmers, created and developed by Dalberg with Rockefeller Philanthropy Advisors and funded by the Bill & Melinda Gates Foundation in 2019. The Human Account (THA) is a three-dimensional research framework aiming to better understand customers in emerging markets based on their contextual, behavioural, and psychological dimensions. While the THA segments were created to understand users' financial health rather than digital engagement, they can provide useful insights into the digital usage trends we observe among digital platform users. See Annex for more information on THA.

Segments of Women

THE SELF-STARTERS (High-users)

Mostly digitally savvy women who leverage multiple online channels to educate themselves further on new digital tools and services. Due to their digital savviness, they are the most likely to hear of Arifu from mass and social media and are also least likely to need guidance during registration. Women in this segment are most likely to be in a farmer or savings group and are often the leaders in their groups; consequently, they are most likely to share their knowledge of Arifu with peers. Self-starters exhibit the highest levels of curiosity and proactiveness of all segments and are therefore most likely to explore content on other value chains once they exhaust the learning programs on the value chains they first engaged with, even without receiving a reminder or re-engagement SMS. They are also the most likely to take the test and score highest of all segments. These women are also most likely to adopt new products/services that they learn about from Arifu e.g., loans and inputs. Psychometrically, they are optimistic, have a high sense of agency and feel positive about the future, they also have high levels of trust in financial services, which makes them more likely to take out loans. They are most likely to constitute the Educated Planners segment of Kenyan women in The Human Account.

THE CURIOUS FOLLOWERS (Average users)

This segment is moderately digitally savvy and constitutes the average-user segment of Arifu. A few are likely to learn of Arifu from mass media, particularly vernacular radio stations, but most learn about Arifu through SMS. They are likely to self-register but may wish for guidance during the registration process. These women farmers are also more likely to be in groups and a few are leaders in their groups, however, they are less likely to share their knowledge of Arifu with their peers, likely because of moderate engagement and enthusiasm. They exhibit moderate levels of curiosity and some may explore content in other value chains/modules, however, most are likely to stick to content on a specific value chain. This segment is likely to try questions but may be less likely to finish answering them than superusers. They also require SMS reminders to engage with content. Psychometrically, they are slightly more open than other female farmers and likely to experiment with new financial and digital services, but their usage may be limited by lower incomes than those of self starters. They most closely resemble the Careful Strivers segment in The Human Account of Kenyan women farmers.

THE UNINTERESTED SKEPTICS (Low users)

This segment has low levels of digital-savviness and are the segment that engages the least with Arifu. They typically own a feature phone or share one with spouse/family. Therefore, they often rely on in person trainings, and trusted members in the community to stay up to date with current trends. Due to their low levels of digital savviness, they are least likely to learn of Arifu from other sources and mostly hear of Arifu from SMS. They are most likely to need assistance during registration. This segment is also likely to be in farmer groups but are least likely to be leaders in the groups and are often inactive. They are therefore the least likely to share about Arifu with peers. Psychometrically, they exhibit the lowest levels of curiosity and proactiveness. The segment is likely to have lower trust than average and are most likely to be the suspicious of SMSs from new numbers and see them as scams. They are also likely to have low self-esteem and a negative view of the future, and are resigned to their current circumstances. They closely resemble the Reserved Individualists in The Human Account.

Source: Dalberg analysis, Arifu farmer Interviews, 2020

The Self Starter: Product Use

AWARENESS

- **Channel for first exposure to Arifu:** Most self starters are likely to hear of Arifu through mass media or SMS from Arifu.
- **Peer-to-peer sharing**: They are more likely to share their knowledge of Arifu with peers, particularly in a group (c*hama)* setting.

ONBOARDING AND TRAINING

- Self starters self-register themselves onto the Arifu platform and are less likely to need guidance during the registration process. They may however struggle to find the code for registration initially, if they hear about Arifu from mass media and fail to note the code down.

PRODUCT USE

- **Learning modules:** After they send registration details (name, identification number, date of birth, location), they receive a welcome SMS and start to explore the platform before they settle on their value chain of interest.
- **Learning modules:** They use the service frequently and tend to exhaust the content specific to their value chain. They are also likely to revisit learning content when they need to refresh their knowledge resulting in a high number of interactions.
- **Test scores**: They are more likely to take the test and likely to register higher scores as they engage with content extensively which increases their test-taking confidence.

ADVANCEMENT

- They are very proactive and are most likely to explore content on other value chains once they exhaust the learning modules on the value chain they first engaged with.
- They are motivated to explore additional learning content likely because they want to enhance the productivity of their farms.
- Self-starters are most likely to explore new products/services they learn about from Arifu modules e.g., soil testing and loans.

ONGOING SUPPORT

- They are less likely to require support to understand the learning modules.
- They respond to SMSs from Arifu which drive them to continue to engage with the learning modules but are most likely to take initiative to visit the platform to engage with the learning modules.

The Curious Follower: Product Use

AWARENESS

- **Channel for first exposure to Arifu:** Most have heard about Arifu through SMSs from Arifu with a few learning from mass media (especially vernacular radio stations)
- **Peer-to-peer sharing:** They are less likely to share their knowledge of Arifu with their peers, even in *chama* settings likely because of their moderate engagement which could reflect moderate enthusiasm for Arifu content.

ONBOARDING AND TRAINING

- These farmers self-register after receiving the SMS from Arifu and are less likely to need guidance on the registration process .

PRODUCT USE

- **Learning modules:** They are more likely to focus on a specific value chain they are working on with the partner platform.
- **Learning modules:** They use it frequently (though less than self-starters) and are more likely to focus on the module that aligns with their specific value chains.
- **Test scores**: Are likely to try the test questions but more likely to not finish answering the questions, likely because of low levels of confidence arising from limited interaction with learning modules.

ADVANCEMENT

- They are less proactive and are most likely to stick to the same learning modules.
- They are moderately motivated to advance to new learning content and therefore less likely to explore content on value chains they do not focus on.
- Are less likely to adopt new products/services learnt of from Arifu likely due to moderate interest.

ONGOING SUPPORT

- They are less likely to require support to understand learning modules.
- They are more likely to require SMSs from Arifu to nudge them to continue engaging with the learning modules.

Source: AGRIFIN Gender Impact Assessment, Farmer Interviews, 2020

The Uninterested Skeptic: Product Use

AWARENESS

- **Channel for first exposure to Arifu:** Most hear about Arifu through SMS from Arifu.
- **Peer-to-peer sharing**: Are least likely to share their knowledge of the Arifu platform with peers, likely because of limited engagement, with most barely able to recall interacting with Arifu content

ONBOARDING AND TRAINING

- They reply to the message with specific instructions and prompts to proceed to register. These farmers self-register themselves after receiving the SMSs from Arifu.
- They are most likely to need guidance on the registration process.

PRODUCT USE

- **Learning modules:** They are most likely to focus on a specific value chain they are working on and even then, have limited engagement with learning content, often replying to the first few SMSs and discontinuing engagement.
- **Learning modules:** They use it infrequently and stop usage after a few interactions likely because of low levels of interest, trust, and/or low literacy levels.
- **Test scores**: Are least likely to take the test due to limited interactions with learning content; and when they take the test are likely to have lower scores than average.

ADVANCEMENT

- They are the least proactive segment and are most likely to stop usage after a few interactions.
- They exhibit the lowest levels of motivation to advance to new learning content and therefore less likely to finish modules on any value chain.
- Are the least likely to take up new products/services, likely due to low levels of interaction with modules limiting chances to learn of the products/services.

ONGOING SUPPORT

- They are most likely to require support to understand the learning modules.
- They are most likely to require frequent SMSs from Arifu to drive them to continue to engage with the learning modules.

Source: AGRIFIN Gender Impact Assessment, Farmer Interviews, 2020

Shared Mental Models of Women: Elicitation Methodology

Mental models are the sum of beliefs and attitudes about a product or service, and they heavily influence the extent to which people engage with a product or service and for what purpose.

Based on the women segments identified, we added a behavioral lens to identify beliefs, aspirations and values systems that are most likely underpinning decision making to use digital solutions and current observed trends in uptake and usage for each segment.

Our approach to eliciting the shared mental models across the women segments involved 3 stages:

- Understanding user beliefs and aspirations and linkages to perceived value of Arifu.
- The actual perceived value and how this differs from the conceptual value proposition.
- Identifying the cognitive dimensions and biases driving decision making around uptake and usage of Arifu.

User Beliefs, Values And Aspirations

Through content analysis based on the Means End Chain Theory elicitation method for qualitative interviews we identified user farming and non farming specific goals. This aids in understanding underlying motivations for usage and advancement in using digital solutions.

User Perceived Value Proposition

We unpacked the user expectations and perceptions of the product value and how this may link to aspirations. We identify the features that users perceive to be the most valuable through self reported and quantitative data.

Cognitive Dimensions and Cognitive Biases

We categorise user decision making under 4 broad cognitive dimensions that can be defined by 2 systems of thought. System 1, a subconscious system that uses deep seated beliefs and biases to make quick judgements. System 2: a more deliberate and methodical system that seeks new information or evidence for decision making.

Source: Farmer Interviews 2020 & 2021, Busara Mental Model Analysis, Kahneman 2011, Langan-Fox, 2000

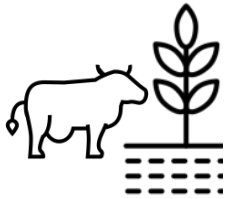
Shared Mental Models: Values and Aspirations

User values, belief systems and aspirations play a significant part in guiding a broad range of decision making and behavior. We elicited some of the underlying beliefs and personal aspirations that shape women's thinking around their farming and uptake of digital solutions like Arifu.

Traditional Farming Beliefs

Traditional indigenous beliefs on farming have been found to play a key role in how farmers adopt and internalise agricultural best practices. Most men and some women did not hold traditional beliefs that guided their approach to farming or knowledge acquisition. We observed that it was a factor particularly for the lower user segment. Some of these beliefs were around weather indicators such as tracking rain patterns through particular animals and ignoring practices around certified seed selection in favour of seeds from previous harvests.

"When some birds come, we believe the rains are coming for farming. When we see a squirrel it signifies bad luck. These beliefs do guide our farming at times."
| WOMAN| FARMER | 39



Value Chain Expansion

All women desired to expand their farming activities to improve their standard of living to better support themselves or give their children a better education. Aspirations around expansion were mostly around animal farming. However we observed self starters showed interest in expanding into new crop value chains and possibly gaining more land, which was more similar to the aspirations of men.

"[In 5 years] I will have expanded my chicken farming and in farm produce."
| WOMAN| FARMER | 52 | Kericho

Source: Farmer Interviews 2020 & 2021, Busara Mental Model Analysis

Shared Mental Models: Perceived Value

Perceived value or benefits of a product or service has an impact on user decisions on uptake and thereafter continued use. We distilled how women collectively perceive the value or benefits of Arifu learning based on their individual mental model.

Accurate and accessible farming advice

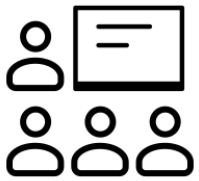
Some women expressed they often followed a trial and error method in thinking through solutions for their farming challenges. Arifu's easily accessible advice on farming practices from the use of certified seeds to soil testing was of significant value to women.

"I have benefitted to learn in farming on the best time to plant and using manure. I get advice instantly"
WOMAN | FARMER | 42 | Makeni

Being business minded

Uninterested skeptics and some curious follower segments of women think of farming at a subsistence level for their family needs. Self starter segments of women are keen on growing profitable farming business for commercial sale and particularly valued the business modules/programs that developed their entrepreneurial capacity.

"[The most valuable feature] is how to get loans for farm inputs"
WOMAN | FARMER | 50 | Makeni



Interpersonal engagement/training

Although most engagement with Arifu is done remotely, some women shared expectations of being able to engage in in-person sessions or reach out to Arifu representatives on the ground. Although women's household responsibility means that they are more time constrained, they are still active in local farming groups and value in-person learning styles from time to time.

To what extent does farmer mental models of perceived attributes of Arifu align with product conceptual model?

We observed that women's perceived value of the Arifu platform was in sync with the product except expectations of direct credit access and in person learning options

Broadening knowledge on farming best practices and accessing credit were some of the most valued components of the learning platform.

Source: Farmer Interviews 2020 & 2021, Busara Mental Model Analysis

Cognitive Dimensions of Women's Decision Making

Common Cognitive Dimensions

System 1

Faith
Belief Systems

Preference
personal Desire

System 2

Logic
Rational Thinking

Evidence
Proven or Tested

Preference

Decision making around usage of Arifu's learning platform was mostly driven by personal preference to improve practical knowledge on specific topics or value chains. Women made this decision independently with little to no approval needed from their spouse. We observed that social norms played a limited role in adoption given the channel of awareness is mostly through direct SMS messaging.

Evidence

Decision making around continued usage and advancement in engaging with Arifu was mostly due to the efficacy of the content learnt and results gained from application.

Observed Cognitive Biases

Anchoring

Decision making on interaction with learning programs is often anchored on the value chain or module women are first introduced to. This may limit their desire to explore other modules especially for the ' uninterested skeptic' segment of women.

Confirmation Bias

Few women within the "uninterested skeptics segment' and men may seek to confirm previously held traditional belief system around farming practices by disregarding the certain learning topics that may contradict these existing beliefs.

Social Proof

Evidence of the profitability and productivity of farmers using Arifu has helped drive interest and engagement with platform for women across all segments , more so for the self starters and curios followers.

Although we observed elements of **faith based mental models** in the form of farming traditional beliefs and **logic based mental models** observed through trial and error in finding farming solutions. Preference and evidence based thinking were observed to be more dominant.

Source: Farmer Interviews 2020 & 2021, Busara Mental Model Analysis

Mental Model Summary

LEVERS

Farming growth & financial aspirations

Observed efficacy through successful application of programs learned

Desire for new program content to achieve value chain expansion

Adoption

Usage and Advancement

BARRIERS

Deep seated traditional farming beliefs: disregard for new knowledge

Limited awareness of Arifu Brand

Anchoring: Limit interactions with new learning programs

Time constraints limit extended learning

Preference for in-person training or touch points

The Self Starter and Curious Follower Mental Model

Women who share this progressive mental model are open to gaining new knowledge to increase farming productivity and profitability. These women are more likely to have joint or full ownership of the land or have the liberty to make decisions on farming practices. They prioritise interaction with training content despite time constraints and are keen to explore other programs beyond their initial preference. Their decision making is driven by their aspiration to expand their value chains and develop new streams of income. They require little external support in advancement.

The Uninterested Skeptic Mental Model

This mental model categorizes women who have a traditional outlook on their farming activities. They do not have clearly defined goals for their farming mostly likely because they see agriculture as a form of subsistence farming. Although they have aspirations centered on giving their children an education they are more accustomed to working hard and not smart with some still holding on to traditional framing practices based on culture and superstition. These women usually have limited decision making power and require more prompting (remotely and in-person) to consider beneficial learning programs.

Source: Farmer Interviews 2020 & 2021, Busara Mental Model Analysis

Engagement Impact

Impact of Engagement on Women's' Livelihoods

Arifu has helped women access information more easily, avoid farming losses, and increase their incomes

Impact category	Key findings	Quotes
Livelihood	• **Increase in yields and income:** all women farmers interviewed report that knowledge of better agricultural practices gained from Arifu led to an increase in productivity/yields and consequently increased income from their farming ventures. This increase in disposable income increased their financial independence which enabled them to have more power on how to spend. Most spent the money on sending their children to school, diversifying their family's diet, and on themselves. • **Agribusiness**: many women indicate that they now see agriculture as a viable business venture (kilimo biashara) as opposed to just a subsistence activity due to the knowledge they gained from Arifu which they envision will increase their income. • **Cost savings**: Some women farmers report that the knowledge they gained through the Arifu platform helped them successfully invest in new agricultural ventures, particularly poultry, helping them avoid making losses resulting from loss of chicks to diseases and cold. • **Loan repayment:** some women farmers indicate they learnt how to invest loan money better, enabling them to repay their loans.	*"Now I can avoid making losses and will earn more income from my chicks."* WOMAN| FARMER | 36 | KERICHO *"Sometimes we farm but do not have knowledge - we just used to do what our parents did, but now I am able to do agribusiness."* WOMAN| FARMER | 38 | MURANG'A

Source: Dalberg analysis, Arifu farmer Interviews, 2020

Impact of Engagement on Women's' Livelihoods

Arifu has helped women farmers become more confident farmers, gain respect from their peers, become more assertive and save time in their farming activities

Impact category	Key findings	Quotes
Lifestyle	• **Agency**: Women farmers indicate having increased control to learn. This agency comes from having access to the content at any time, giving them the ability to decide and plan on how and when to learn. • **Decision making**: Gaining knowledge from Arifu on value chains of interest has served as a catalyst for some women farmers to invest in new value chains. Some women farmers first seek knowledge on specific value chains before investing e.g., a woman farmer invested in chicks after completing modules on chick rearing. This is likely driven by the risk aversion of many women farmers. • **Confidence**: All women farmers interviewed indicate that knowledge gained on Arifu has helped them become confident farmers, boosting their self-esteem and trust in their abilities as farmers. • **Social capital**: Women farmers report a noticeable change in social standing in their villages and groups resulting from the application of knowledge gained from Arifu. Women farmers report that the observable success on their farms has resulted in respect from their peers who often inquire how they gained their success. • **Time savings**: some women farmers indicate that adoption of new farming techniques and inputs have enabled them to save time which they now spend on other productive activities. Time savings result after they learn about, and adopt new, efficient farming techniques.	*"I would say Arifu has helped me plan because now I have a source of information."* WOMAN | FARMER| 38 | MURANG"A *"It (Arifu) gave me confidence and motivated me to actualize my plan to start rearing chicken."* WOMAN| FARMER | 24 | KERICHO

Source: Dalberg analysis, Arifu farmer Interviews, 2020

Recommendations

Arifu can further engage and support women by enhancing conversion of more women farmers into users, deepening usage, and facilitating sustained use

1 Enhance conversion of women farmers into Arifu users

- **Enhance recognition of the Arifu brand** to increase farmers' trust;
  - **Create more awareness about Arifu to promote brand recognition and trust through channels women farmers interact with most** e.g., farming shows and local-language radio and TV stations.
  - **Encourage women farmers to refer their peers to join Arifu via SMS and potentially offer incentives for peer references, e.g., airtime**. This can help raise awareness, trust and consequently conversion as women are more likely to trust services referred by peers.
  - **Develop campaigns** with partners that are well-known and trusted to increase awareness about and trust in Arifu
- **Include directions of the registration process more prominently on the Arifu website** for easier reference and registration.
- Avoid anchoring learning expectations with specific learning programs during onboarding and awareness phases by presenting a wide scope of learning opportunities,

2 Deepen usage of learning programs

- **Make Arifu learning modules more convenient** for women users to engage with;
  - **Adjust timing of SMS reminders to times that women farmers are more likely to be free** e.g., lunchtime, evening and Sundays. Due to household responsibilities of women, improved timing of reminder SMS can enhance engagement.
  - **Send SMS reminders encouraging women farmers to save the Arifu code**. Women are more likely to have feature phones which have limited storage capacity leading to loss of Arifu code.
- **Consider additional investment** in alternative modes of content delivery;
  - **Consider adopting IVR** as an additional content delivery mode to increase engagement among women who may need to multi-task while learning
  - **Offer a toll-free number** that farmers can call in case of questions/need support when learning.
- **Work with partners to leverage their agents** or on the ground contacts to support farmers who may need further guidance accessing/using Arifu.

3 Encourage sustained use and advancement

- **Make more content available and accessible**;
  - **Send reminder messages prompting farmers to explore other modules** after their initial learning module/path and offer an overview of other modules available.
  - **Broaden learning modules to additional value chains** to increase the range of options that women farmers can choose from e.g., beans, bananas, trees, onions etc.,
  - **Provide directions on where to access additional products and services** mentioned in Arifu content e.g., soil testing and certified inputs.
- **Release content in a timely manner** matching crop cycles or current events e.g., send maize modules before the maize season and content on managing pests when they are prevalent

Source: AGRIFIN Gender Impact Assessment, Farmer Interviews, 2020

Appendix

We interviewed 18 farmers (9 female and 9 male), of various ages, education levels and locations

Farmer + Agent interviews

We have conducted 18 farmer interviews

Gender	Age	Education	Location	Phone type
Female	36	Diploma	Kericho	Feature phone
Female	38	High school	Murang'a	Smartphone
Female	52	Primary school and TVET	Embu	Smartphone
Female	39	High school	Nyandarua	Smartphone & feature phone
Female	40	High school	Bomet	Smartphone
Female	27	High school	Kericho	Feature phone
Female	24	High school	Kericho	Feature phone
Female	50	Primary school	Nyandarua	Smartphone
Female	57	Primary	Bomet	Feature
Male	35	High school	Narok	Feature phone
Male	26	High school	Migori	Feature phone
Male	26	High school	Nyandarua	Smartphone
Male	42	Diploma	Kilifi	Feature phone
Male	45	High school	Nakuru	Feature phone
Male	27	Diploma	Kericho	Feature phone
Male	59	High school	Nyandarua	Smartphone & feature phone
Male	55	A levels	Bomet	Smartphone
Male	50	High school	Nyandarua	Smartphone & feature phone