Assessment of Potential Opportunities for Use of Digital Payments for Smallholder Farmers in Guatemala's Western Highlands

MIT D-Lab
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SUMMARY OF KEY FINDINGS

This research project, *Assessment of Potential Opportunities for Use of Digital Payments for Smallholder Farmers in Resource Constrained Settings*, explored 1) how digital financial services (DFS) could help address the unmet financial needs of smallholder farmers (SHFs); 2) the conditions under which SHFs adopt DFS to meet these needs; and 3) how different stakeholders perceive farmer needs, DFS availability, and incentives and barriers to DFS use in Guatemala. Tables 1 and 2 provide a summary of the key findings of the report as well as a short summary of recommendations for local decision-makers. The last column in each table indicates supply-side stakeholders who are in the best position to follow up on these findings and recommendations. The report that follows provides more details on the findings, recommendations, and next steps.

Table 1 – Summary of Findings, Recommendations, and Key DFS Stakeholders in Guatemala

Finding	(Provisional) Implication/Recommendation	Stakeholders
Financial decisions often made collaboratively	Household dynamics should be considered in DFS program design. For example, gender-based interventions can benefit from not assuming the context involving men and women in isolation.	Providers[1] + Enablers[2]
Farmer comfort level at bank differentiated by ethnicity, less so by gender	Financial/digital inclusion requires more than expanding access to bank account ownership and increasing DFS usage. The survey showed that the experience SHFs have when interacting with financial institutions may have an effect on how willing they are in participating in the formal financial system. Sensitivity training, alternative delivery/service options aimed at reducing bias towards farmers with an indigenous background can contribute to a more diverse DFS user base.	Providers + Enablers + Conveners[3]
Financial inclusion lower than digital inclusion	Widespread mobile phone ownership is not directly associated to higher DFS usage. The availability of digital technologies is unlikely to change SHFs cost-benefit calculations if the underlying terms of the financial services offered are not advantageous to them.	Providers + Enablers + Conveners

[1] Providers are organizations that design and deliver digital financial services. They include actors such as banks, telecom companies, and *Fintech* startups.

[2] Enablers are the organizations creating and maintaining the institutions that DFSs need to function as an integrated system. They help in the design of regulations, policies, and programs as well as in the identification of organizational gaps and diffusion of best practices.

[3] Conveners are organizations that aggregate DFS users. They can be organized from the bottom up as farmer cooperatives or from the top down as networks of farmers selling their products for the same private-sector buyer.

Importance of prior organizational relationship for DFS uptake	Organizational relationships are important for SHFs to trust in the DFS system. In Guatemala, the design of appropriate digital financial services can benefit from complementary strategies to build the relationship between the potential user and the service provider.	Providers + Enablers
Most SHFs adopted DFS because they needed to pay a bill or service	The survey data indicated that most DFS users interviewed in Guatemala started using the services out the necessity of making a payment. Providers and enablers can help to expand access to DFS by collaborating with the private sector in services relevant to SHFs (e.g., utility companies, agricultural input firms).	Providers + Enablers
Rapid uptake (month or less) when conditions are right	Each context requires a specific strategy to build trust in the DFS system, and in the Guatemalan case, incumbent providers seem to play a critical role in expanding the DFS user base. Marketing and sales strategies targeting SHFs, with conditions that are advantageous to them, can speed up the expansion of DFS usage in the country.	Providers + Enablers

Table 2 – Summary of Comparative Analysis Findings, Recommendations, and Key DFS Stakeholders in Guatemala and Senegal

Finding	(Provisional) Implication/Recommendation	Stakeholders
DFS can strengthen the relationship between the government & SHFs	Government support of SHFs in the form of direct subsidies represents an opportunity for expanding DFS usage in the country. Supply-side stakeholders should consider alternative public policies with DFS integration as a mechanism to engage SHFs.	Providers + Enablers + Conveners
The sequencing of financial and digital inclusion efforts may affect DFS adoption	DFS expansion is taking place in Guatemala where the rate of financial inclusion among SHFs is relatively high (compared to countries like Senegal). Yet, these relatively high levels of financial inclusion do not always lead to higher rates of DFS adoption. In Guatemala, many SHFs were resistant to starting to use DFS because they are used to accessing banking services in person. Enablers and providers should support awareness-raising campaigns to reassure users of the benefits of DFS.	Providers + Enablers + Conveners

High levels of digital and financial inclusion seem to be relevant to DFS adoption only after SHFs trust the financial system.	Senegalese SHFs trust their financial system, which is consistent with a relatively high proportion of people joining new DFS providers. At the same time, most SHFs take over one year to adopt DFS. One of the explanations for this may be higher poverty rates, as well as low levels of financial inclusion. In Guatemala, relatively high distrust in the financial system creates the need for additional assurances from Providers and Enablers prior to DFS adoption. However, the data shows that if trust is achieved, relatively high levels of financial and digital knowledge may increase the speed of DFS adoption.	Providers Enablers	+
Supply-side participants in Guatemala showed low expectations about SHF behavior, which are often mistaken	Low Supply-side expectation may lead to a misinterpretation of SHFs priorities and behavior, with a potential negative effect on policy. Key instances of potential misinterpretation of priorities: DFS adoption among SHFs seems to be more about trust and better/cheaper financial services than about financial/digital knowledge.	Providers Enablers Conveners	+ +

1. INTRODUCTION

The project, *Assessment of Potential Opportunities for Use of Digital Payments for Smallholder Farmers in Resource Constrained Settings,* was established in 2018 through a partnership between MIT D-Lab CITE (at the Massachusetts Institute of Technology) and USAID's Feed the Future Program (D2FTF). The objective of this research is to better understand the role that digital financial services can play in the financial inclusion of smallholder farmers in Guatemala and Senegal. However, for the purposes of this report, the methods, findings, and recommendations will focus primarily on Guatemala and a comparison between the two countries, leaving the Senegal content to be further addressed in a separate document.

Though the literature on digital financial services (DFS) was relatively recently published, it has documented a variety of lessons learned through the implementation of policies and projects around the world.[4] This study builds on this existing knowledge, with the goal of providing a summary of the key findings of the study, in order to highlight the points most useful to practitioners and decision-makers in Guatemala. Academic papers containing the complete methodology and research results will be published in the future. As such, the findings and recommendations of this report are still tentative, given that they reflect the evidence and analysis available to date.

It is important to define from the outset here three fundamental concepts for the research: *Digital Financial Services*, *Financial Inclusion*, and *Smallholder Farmer*:

- ***Digital Financial Services (DFS)***: "Digital financial services" is a broad category that encompasses Mobile Financial Services (MFS) and all branchless banking services that are enabled via electronic channels. Services can be accessed using a variety of electronic instruments, including mobile phones, card-reading point of sale (PoS) devices, electronic cards (credit cards, debit cards, smart cards, key fobs), and computers. Similarly, "digital payments" refers to mobile payments and electronic payments, while "digital money" refers to mobile money and electronic money.[5]
- ***Financial Inclusion or Access to Finance***: "Access to appropriate financial services that are provided responsibly and sustainably in a well-regulated environment. Although access to informal financial services (services offered by unregulated entities) is a form of access to finance, financial inclusion efforts typically focus on extending access to formal financial services (services offered by regulated entities) to poor and underserved communities."[6]

[4] Nicoletti, B. (2017). The future of FinTech: Integrating finance and technology in financial services. Springer.

[5] Martin, C. et al (2016) USAID Guide to the Use of Digital Financial Services in Agriculture.

[6] Martin, C. (2017) - ibid

- ***Smallholder Farmers***: SHFs is defined in terms of the size of agricultural holdings[7] and the nature of labor on these properties.[8] While acknowledging that "small is a relative concept that is dependent on agroecological as well as socioeconomic considerations," for this study, we define the size of smallholder farm as less than two hectares. "Labor is a key feature of smallholder agriculture. We consider a smallholding to be an agricultural holding run by a family using mostly (or only) their own labor and deriving from that work a large but variable share of its income, in kind or in cash."

Taking into consideration these fundamental concepts, the study investigates three research questions:

1. How can digital services help address the unmet **financial needs** of smallholder farmers?
2. Under what conditions do smallholder farmers (SHFs) **adopt** digital financial services to address these unmet needs?
3. How do stakeholders in the DFS supply and demand-side[9] perceive farmer needs, DFS availability, and incentives and barriers to DFS use?

2. RESEARCH DESIGN, METHODS & IMPLEMENTATION

2.1. Research Strategy

The strategy adopted to respond to the three questions consisted of five phases and took place between June of 2018 and December of 2019. The research phases represent a mix of qualitative and quantitative methodological practices, triangulating different types of data in order to increase the confidence in the results presented.[10] The integration of methodologies followed a sequential exploratory design, where an initial case study is followed by a subsequent quantitative survey.[11,12] This kind of strategy is adequate for cases where a detailed description of the context

[7] From Lowder, S. K., Skoet, J., & Raney, T. (2016). The number, size, and distribution of farms, smallholder farms, and family farms worldwide. World Development, 87, 16-29.

[8] HLPE (2013). Investing in smallholder agriculture for food security. A report by the High-Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security.

[9] The definition of "supply" and "demand" sides is available in detail in section 2 of this report.

[10] Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. Administrative science quarterly, 24(4), 602-611.

[11] Pluye, P., & Hong, Q. N. (2014). Combining the power of stories and the power of numbers- mixed methods research and mixed studies reviews. Annual review of public health, 35, 29-45.

[12] Creswell, J. W., & Creswell, J. D. (2017). Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications.

is necessary to inform data collection on specific trends and behavioral patterns of the research subjects.[13,14]

- ***Phase 1*** - Preliminary research phase, which identifies key research questions, as well as provides the scope and general features of the study design
- ***Phase 2*** - Comparative case-studies (one for each country) describing both the context within which local smallholder farmers live and work and the digital financial services national ecosystem
- ***Phase 3*** - A quantitative survey to identify smallholders' (actual and perceived) financial needs, and conditions for DFS adoption
- ***Phase 4*** - Analysis of the data collected through the survey, identifying key results and lessons for local decision-makers
- ***Phase 5 -*** A series of research dissemination events, including presentations at USAID headquarters in DC and USAID Guatemala, as well as one public workshop and one co-creation event for key DFS stakeholders in Guatemala

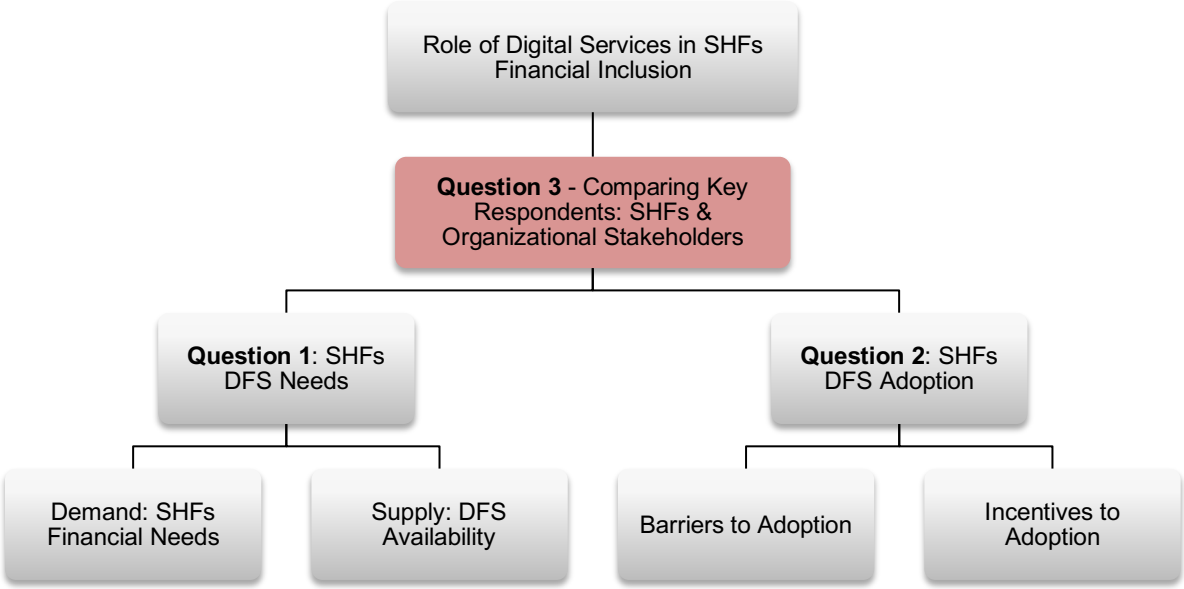
2.2. Research Frameworks

A research framework was built to operationalize each research question, based on the expert interviews and a review of the literature performed during this initial phase of the study (see Figure 1). The first question centers around the dynamics of the supply of digital financial services and the demand for these services by smallholder farmers. The second focuses on the smallholder farmers' behavior and decision-making in terms of barriers and incentives to DFS adoption. In the third question, the goal is to compare and contrast how supply-side actors – organizational stakeholders responsible for *providing* services, creating an *enabling* environment for DFS, and *convening* clients – interpret DFS challenges and opportunities, vis-à-vis demand-side populations – smallholder farmers who potentially could, or do use DFS.

[13] Gable, G. G. (1994). Integrating case study and survey research methods- an example in information systems. European journal of information systems, 3(2), 112-126.

[14] Ivankova, N. V., Creswell, J. W., & Stick, S. L. (2006). Using mixed-methods sequential explanatory design: From theory to practice. Field methods, 18(1), 3-20.

Figure 1 – Summarized Research Framework



As a complement to this general structure, the research team developed operational frameworks for "supply" and "demand" constructs. The objective was to limit the scope of the study and lay out clear guidelines for the development of sampling strategies and the selection of data collection methodologies.

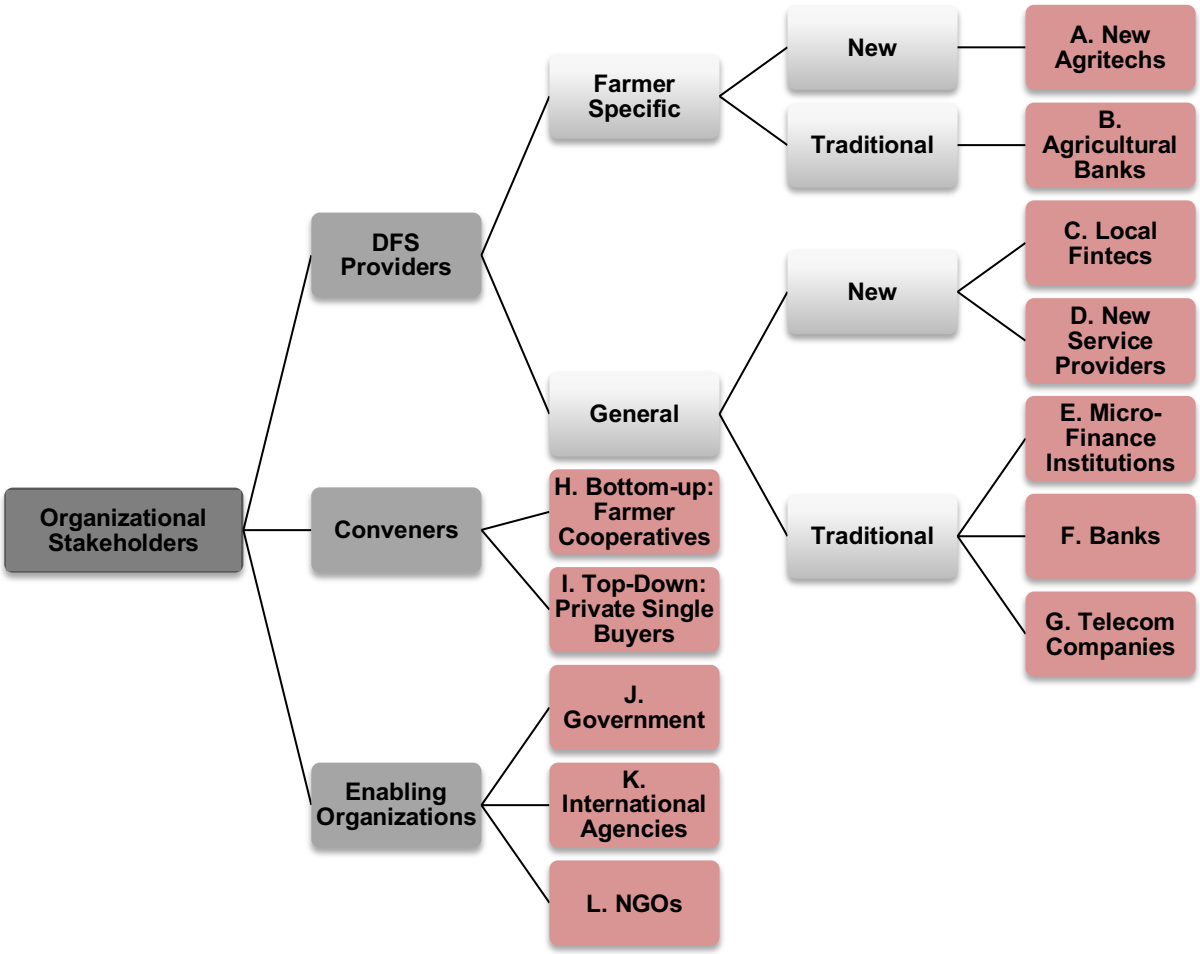
2.2.1. Operational framework for organizational stakeholders

The operational framework for organizational stakeholders was designed around target three types of organizations (See Figure 2):

- **DFS Providers**: Providers are organizations that design and deliver digital financial services, who may or may not target farmers directly. They include more traditional actors such as banks and telecom companies, but also newer digital players like *Fintech* startups. Overall, understanding providers' perspectives (including staff and third-party agents) is important because they can reveal what design principles and assumptions they use when creating services and the challenges and opportunities that emerge during DFS implementation.
- **Conveners**: Conveners are organizations that aggregate DFS users, often providing the scale that allows these services to be effective. They can be organized from the bottom up as farmer cooperatives, or from the top down as networks of farmers selling their products for the same private-sector buyer. By talking to conveners, the research team was able to understand the unique characteristics of these networks, and the preconditions they pose to the appropriate deployment of DFS.

- **Enabling Organizations**: Enablers are the organizations creating and maintaining the institutions that DFS need to function as an integrated system. They help in the design of regulations, policies, and programs, as well as in the identification of organizational gaps and diffusion of best practices. From them, the study uncovered more about the history of DFS in the country, major sectoral initiatives, and current DFS challenges and opportunities at a systemic level.

Figure 2 – Summarized Sampling Framework for Organizational Stakeholders



2.2.2. Operational framework for smallholder farmers

The operational framework for smallholder farmers was designed according to the following criteria (See Figure 3):

- **Institutional Partners**: Since USAID is the main institutional partner of the study, the research took advantage of its infrastructure and contacts in the field to implement data collection activities. However, the research sought to minimize potential selection bias by collecting additional data via alternative partners. These are organizations without formal

connections with USAID such as local DFS providers, private agricultural firms with large network of suppliers, or SHF cooperatives. Due to feasibility considerations, the main goal is to select at least one of these organizations and recruit some of their clients as a reference group.

- **Location**: The study focused on areas where access was feasible, the population of low-income smallholder farmers was large, and agricultural practices were diverse and representative of the local context. Recognizing USAID as our main implementing partner, it was critical for the study that research sites overlapped with areas where USAID projects were operational.

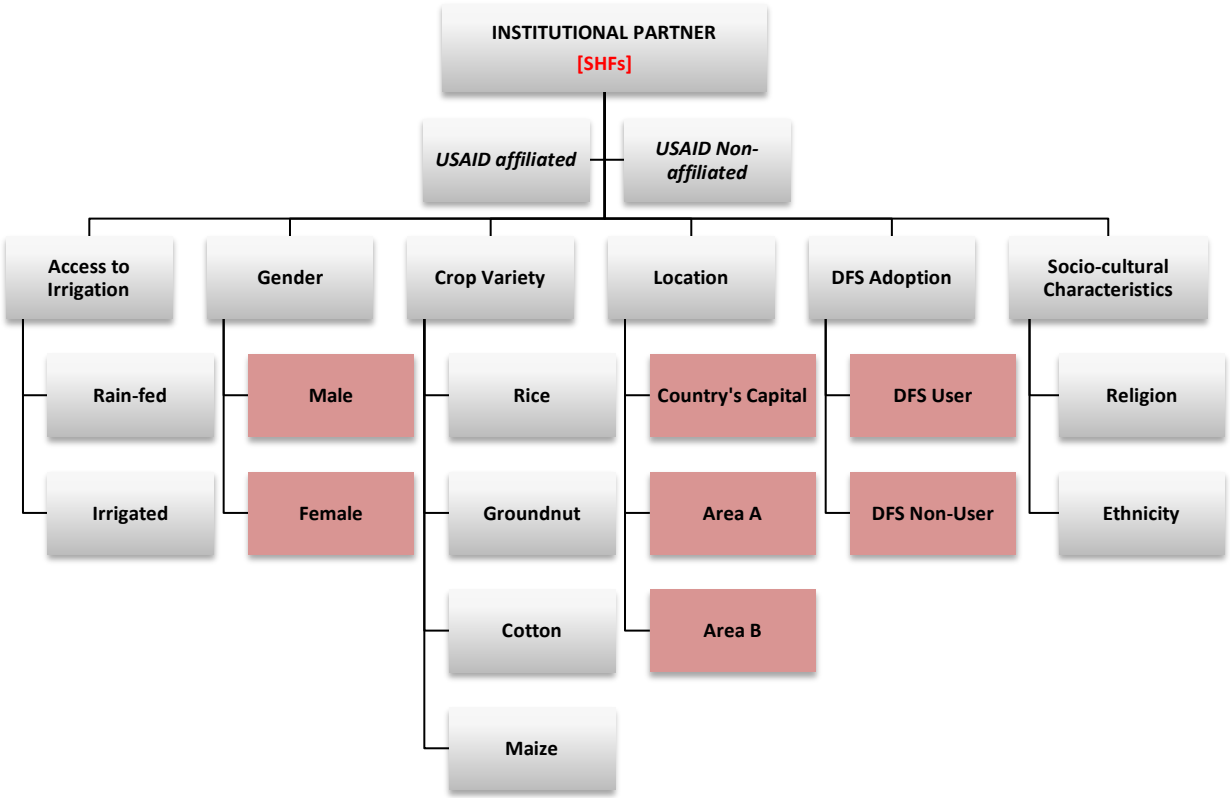
- **Gender**: Depending on local social norms and other contextual factors, women and men can have dissimilar experiences related to agriculture, as well as DFS access and use. As such, the study included gender considerations in its sampling (e.g., building a sample with a proportional number of male and female respondents), data collection methods and practices (e.g., in the qualitative phase, focus group discussions were separated by gender), and research content (e.g., asking questions that identify gender-based variations in behavior).

- **Crop Variety**: Crop variety was an important factor in assuring the comparability between the case studies in Senegal and Guatemala (see table below). As such, the study selected crop types considering both context-specific factors (export value and national consumption patterns), and aspects that would favor comparability (by selecting crops that are relevant to both countries).

- **DFS Adoption**: One of the objectives of the study was to understand behavior patterns of smallholder farmers that adopt DFS and those who do not. As such, research sampling, methods, and questions were designed trying to capture the experience of participants who were DFS users and who were not.

- **Socio-cultural Characteristics**: Both Senegal and Guatemala are characterized by unique social and cultural characteristics. Mixing the locations of data collection and being mindful of at least some of these cultural differences during fieldwork can prevent biases in the analysis. The objective was to avoid a situation in which the pool of respondents was too heavily populated with people from the same religion, ethnicity, or historical background.

Figure 3 – Summarized Sampling Framework for SHFs



2.3. Study Sites

The study focused on two major areas in Guatemala. The first was Guatemala City, which is the country's capital, and where most relevant institutional stakeholders are located. The second was the Western Highlands, comprised of the departments Quiché, San Marcos, Huehuetenango, Quetzaltenango, and Totonicapan (see Figure 4).

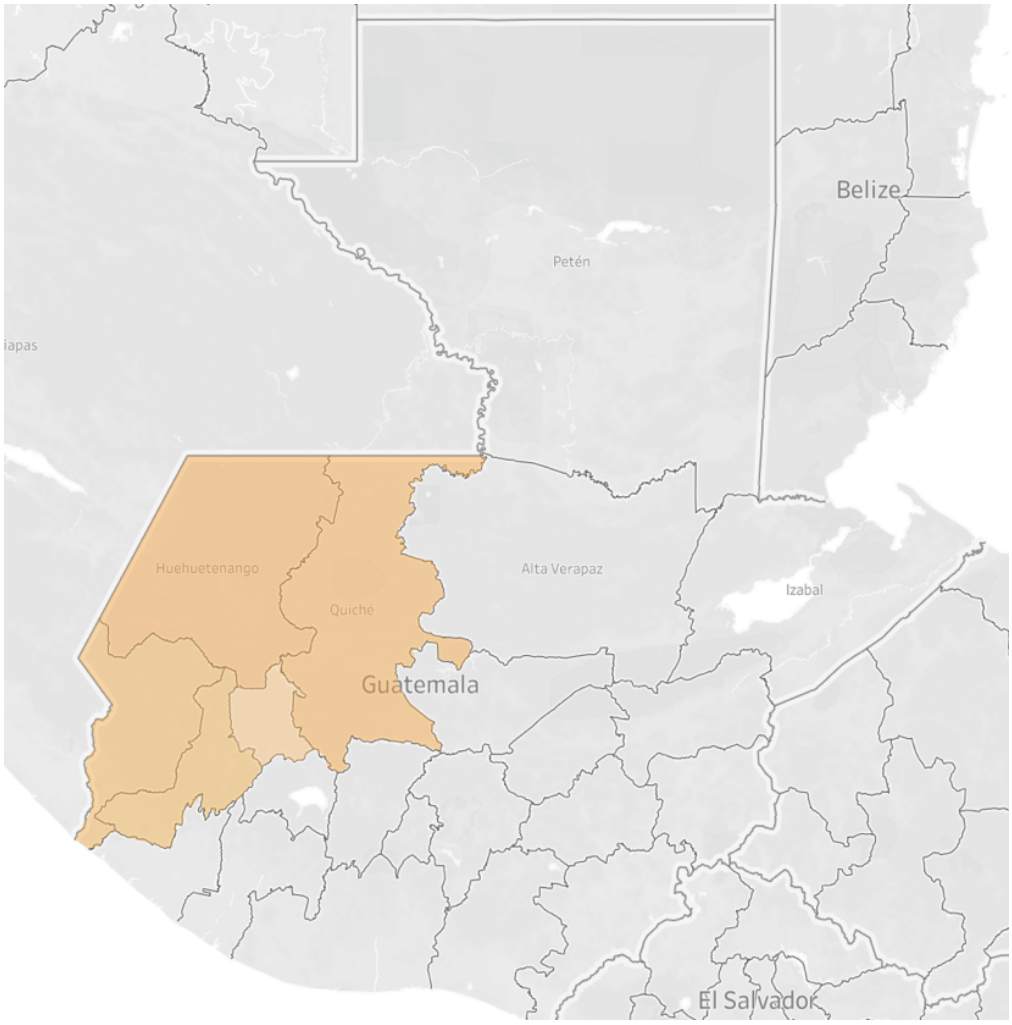
These departments have been historically associated with high levels of poverty and malnutrition,[15] and have a large concentration of smallholder farmers and indigenous populations,[16] which are both consistent with the research objectives (see Table 3). In addition, USAID and other development organizations concentrate food security and income generation

[15] CSIS (2017) Tracking Promises - Analyzing the Impact of Feed the Future in Guatemala

[16] Recent estimates indicate that Guatemala's population is between 45% and 60% indigenous, divided between 24 ethnic groups. Indigenous populations are prevalent in the Western Highlands, where there are as many as 1.6 million on them live. Mam and K'iche' ethnicities are among the largest groups in the region, so our study conducted field activities in areas where these two ethnicities would be represented in the sample. IWGIA (2018) Guatemala. Available at: https://www.iwgia.org/en/guatemala and CSIS (2017) Tracking Promises - Analyzing the Impact of Feed the Future in Guatemala. Available at: https://www.csis.org/analysis/tracking-promises

activities in that region,[17] facilitating the selection of partner organizations to help implement the study.[18]

Figure 4 – Map of Study Sites



[17] USAID (2017) Guatemala Fact sheet. Available at: https://www.usaid.gov/sites/default/files/documents/1862/Guatemala_External_Fact_Sheet_July_2018.pdf

[18] Ibid

Table 3 – General Characteristics of Potential Research Sites in Guatemala

Characteristics/Department	Quetzaltenango	Huehuetenango	Quiche	San Marcos	Totonicapan
Rural Population[19]	42%	71%	70%	73%	53%
Indigenous Population[20]	52%	58%	89%	27%	97%
% of Rural Population, within total population living in poverty[21]	52%	82%	75%	81%	58%
Major Indigenous Group	Mam + K'iche'	Mam	K'iche'	Mam	K'iche'
HDI[22]	0.58	0.49	0.47	0.51	0.58
USAID Operations	Yes	Yes	Yes	Yes	Yes

2.4. Implementation Partners

The fieldwork planning and implementation in Guatemala relied on several institutional partners (see Table 4 below) for the identification and recruitment of research participants, especially during phases 2 and 3 of the project. This group represents a diverse pool of organizations with and without direct ties to USAID and working in a variety of fields such as banking, telecom, agricultural businesses, farmer cooperatives, and NGOs.

[19] Government of Guatemala (2011) Mapas de pobreza Rural en Guatemala 2011. Available at: https://www.ine.gob.gt/sistema/uploads/2015/09/28/V3KUhMhfgLJ81djtDdf6H2d7eNm0sWDD.pdf

[20] Ibid (Govt. of Guatemala (2011)

[21] Ibid (Govt. of Guatemala (2011)

[22] Ibid (Govt. of Guatemala (2011)

Table 4 – Implementation Partners in Guatemala

Universidad Del Valle (UVG)	Local University
Buena Milpa (CIMMYT - International Maize and Wheat Improvement Center)	Research Organization
USAID Guatemala (Projects Más Frijol and Mas Riego)	International Development Organization
Tigo	Private Business (Telecom Company)
HRNS Neumann Foundation	Non-Governmental Organization
CDRO	Non-Governmental Organization
MICOOPE	Farmer Cooperative
Banrural	Bank (Largest Rural Bank in Guatemala)
FEDECOCAGUA	Federation of Cooperatives
POPOYAN	Private Business (Large Agricultural contractor and exporter)
Salcaja	Farmer Cooperative
OLAM	Private Business
ADIPO	Farmer Cooperative

2.5. Research Methods

With the development of the general and operational research frameworks, as well as the definition of the study sites and implementation partners, Phases 2 and 3 of the study used complementary methodologies.

2.5.1. Exploratory case study

Phase 2 consisted of an exploratory case study focusing on Guatemala's Western Highlands and Guatemala City. The strategy allowed the research team to test the feasibility of the study, develop operational measurements, and form tentative hypotheses to be tested in Phase 3.[23,24] Phase 2 was largely qualitative, and followed a *grounded theory* approach,[25] creating a "thick description" of the local context, its social and economic characteristics, as well as participants' actions and

[23] George, A. L., & Bennett, A. (2005). Case studies and theory development in the social sciences. MIT Press.

[24] Yin, R. K. (2017). Case study research and applications: Design and methods. Sage publications.

[25] Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. Qualitative sociology, 13(1), 3-21.

points of view.[26, 27] This information was critical to better understand smallholder farmers, what financial needs they have, and the conditions underlying their decision to use digital financial services or not. Specifically, Phase 2 relied on the following qualitative methodologies:

- ***Document analysis:*** The team reviewed project documents, reports, and databases produced by relevant organizational stakeholders. The goal was to identify historical and contextual aspects that can inform the development of the research questions and hypotheses the team probed during Phase 3.[28]
- ***Direct observation:*** During the fieldwork, researchers sought opportunities to observe research participants in their own environment. For example, field visits included trips to farming input stores, mobile agent shops, and local bank branches.
- ***Semi-structured interviews:*** The research team interviewed representatives of organizational stakeholders and smallholder farmers as outlined in the research framework. The priority was to create a variability sample,[29] where respondents provide a diverse set of perspectives about DFS' relevance to smallholder farmers. Specific interview protocols were prepared to address questions specific to each target population.
- ***Focus group discussions:*** FDGs were used as a mechanism for data collection from smallholder farmers. This methodology allows for the gathering of information from a relatively large number of respondents within a short timeframe.[30] Furthermore, FDGs are considered friendly to people who cannot read or write (which is the case of some SHFs), and to people who may otherwise feel intimidated by individual interviews.[31]

2.5.2. Quantitative survey

Phase 2 provided details about two key factors: i) contextual nuances of the local DFS ecosystem; and ii) logistical constraints that helped the team define the scope and scale for Phase 3. The development of the survey instrument was also informed by existing research on

[26] Maher, C., Hadfield, M., Hutchings, M., & de Eyto, A. (2018). Ensuring Rigor in Qualitative Data Analysis: A Design Research Approach to Coding Combining NVivo With Traditional Material Methods. International Journal of Qualitative Methods, 17(1), 1609406918786362.

[27] Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. Qualitative sociology, 13(1), 3-21.

[28] Bowen, G. A. (2009). Document analysis as a qualitative research method. Qualitative research journal, 9(2), 27-40.

[29] Ibid Daniel, J. (2011)

[30] Stewart, D. W., & Shamdasani, P. N. (2014). Focus groups: Theory and practice (Vol. 20). Sage publications.

[31] Kitzinger, J. (1995). Qualitative research: introducing focus groups. Bmj, 311(7000), 299-302.

financial and digital inclusion in rural areas.[32,33,34,35,36,37,38,39] This evidence was especially useful to frame questions about smallholder farmers' access to, and adoption of DFS. However, the same was not true for comparing how supply and demand sides perceive DFS challenges.

With little precedent in the digital finance literature, the team pursued methodological strategies in areas like medicine, where there have been studies about how doctors and patients differently perceive symptoms of chronic diseases,[40,41] as well as in political science, where scholars explored how the general public and policy experts perceive corruption at the national level.[42]

Drawing from these examples, the research team created an adapted "mirror survey" approach, which consists of two questionnaires – one for smallholder farmers, and another for participants from the supply-side – with similar questions and structure (see Tables 5 & 6).

The demand-side questionnaire had a total of 85 questions and was conducted in person by a team of local researchers. The supply-side questionnaire had 75 questions and was conducted either in person by the Guatemalan research team or self-administered online via an anonymous survey link. Both questionnaires required between 30 and 45 minutes to complete.

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[32] CGAP (2016) Smallholder Household Survey - Building the Evidence Base on the Agricultural and Financial Lives of Smallholder Households. Available at: http://microdata.worldbank.org/index.php/catalog/2922

[33] Finau, G., Rika, N., Samuwai, J., & McGoon, J. (2016). Perceptions of digital financial services in rural Fiji. Information Technologies & International Development, 12(4), pp-11.

[34] World Bank (2017) Global Findex Questionnaire. Available at: https://globalfindex.worldbank.org/sites/globalfindex/files/databank/2017%20Findex%20questionnaire.pdf

[35] BFA (n.d.). Financial Diaries Project Questionnaires. Available at: http://financialdiaries.com/about

[36] OECD (2018). Financial inclusion and consumer empowerment in Southeast Asia. Available at: http://www.oecd.org/finance/Financial-inclusion-and-consumer-empowerment-in-Southeast-Asia.pdf

[37] CGAP (2018). Financial Diaries with Smallholder Families. Available at: http://www.cgap.org/data/data-financial-diaries-smallholder-families

[38] IFC (2016). Mobile banking Questionnaire for users. Available at: https://www.ifc.org/wps/wcm/connect/571be8004e23021c939fbb7a9dd66321/Tool+3.9.+Market+Questionnaire+-+Users.pdf?MOD=AJPERES

[39] IFC (2016). Mobile banking Questionnaire for non-users. Available at: https://www.ifc.org/wps/wcm/connect/75112a804e2301d39396bb7a9dd66321/Tool+3.10.+Market+Questionnaire+-+Non-Users.pdf?MOD=AJPERES

[40] Barr, R. G. et al (2005). Physician and patient perceptions in COPD- the COPD resource network needs assessment survey. The American journal of medicine, 118(12), 1415-e9.

[41] Celli, B. et al (2017). Perception of symptoms and quality of life–comparison of patients' and physicians' views in the COPD MIRROR study. International journal of chronic obstructive pulmonary disease, 12, 2189.

[42] Razafindrakoto, M., & Roubaud, F. (2010). Are international databases on corruption reliable? A comparison of expert opinion surveys and household surveys in sub-Saharan Africa. World development, 38(8), 1057-1069.

Table 5 – Examples of Questionnaire Vignettes & Questions

Demand-side vignette:	*In this section of the research, we will ask you a few questions about how you use digital technologies such as mobile phones.*
Demand-side Question:	*Do you own a mobile phone?*
Supply-side vignette:	*In this section of the survey, we will ask you will ask you about YOUR PERCEPTION of how smallholder farmers use digital technologies such as mobile phones.* *Please think of a real small farmer with whom you have had contact recently, who is a representative of most of the farmers you work with.* *If you do not have direct contact with small farmers yourself, think of a typical small farmer who benefits from the projects or services provided by your organization.*
Supply-side Question:	*Do you think this typical smallholder farmer owns a mobile phone?*

Table 6 – Mirror Questionnaire Structure

Questionnaire Section		
Section 1	**Socioeconomic Profile** *(age, gender, education, etc.)*	**Participant's Socioeconomic Profile** *(age, gender, education, professional activity, type of employer, etc.)*
Section 2	**Agricultural Profile** *(type of crop, land ownership, etc.)*	**Typical SHF - Socioeconomic & Agricultural Profile** *(age, gender, education + type of crop, land ownership, etc.)*
Section 3	**Digital Inclusion Profile** *(mobile phone/computer ownership, usage, etc.)*	**Typical SHF - Digital Inclusion Profile** *(mobile phone/computer ownership, usage, etc.)*
Section 4	**Financial Inclusion Profile** *(bank account ownership, usage, as well as savings, borrowing, transfers, payments and insurance activities)*	**Typical SHF - Financial Inclusion Profile** *(bank account ownership, usage, as well as savings, borrowing, transfers, payments and insurance activities)*
Section 5	**Barriers & Incentives to DFS Adoption** *(DFS adoption and usage, reasons for using DFS or not, etc.)*	**Typical SHF - Barriers & Incentives to DFS Adoption** *(DFS adoption and usage, reasons for using DFS or not, etc.)*

Whereas the demand-side questionnaire would provide data for answering research questions 1 and 2, the supply-side questionnaire allowed the team to address question 3. Most of the analysis contained in this report was based on descriptive statistics of relevant sections of the survey, while chi-square or t-tests were used to conduct bivariate analyses of some variables to determine significant associations, especially in the comparative analysis between demand and supply responses, as well as between the data gathered in Guatemala and Senegal.

3. RESULTS

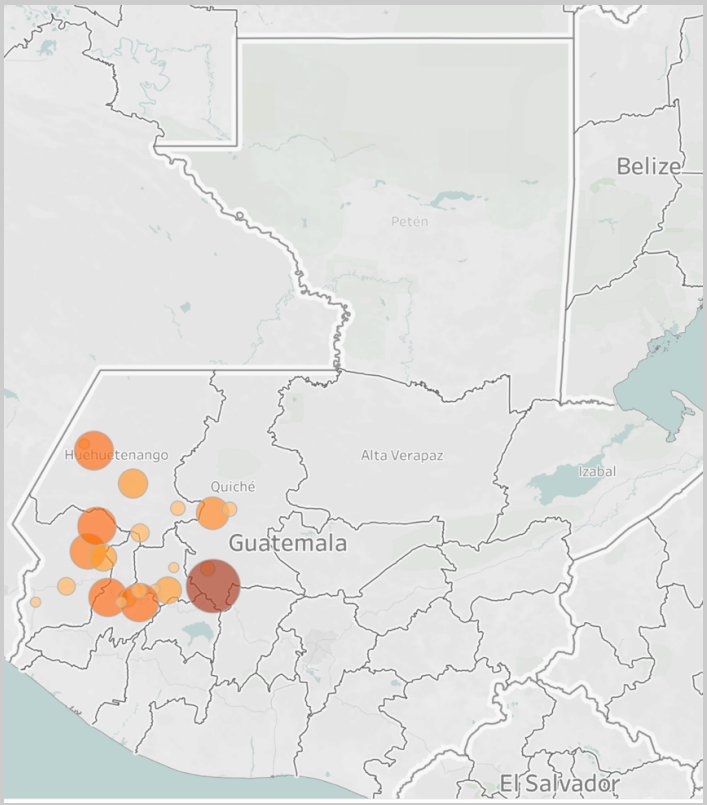
The results presented here were shared with key stakeholders in Washington, D.C. and Guatemala. In Guatemala, the team also worked with *Link 4* to host a co-design workshop to discuss the findings and create teams of local stakeholders to brainstorm ideas to address challenges identified through the research.

3.1. Sample Characteristics

Following a purposeful, multi-stage sampling strategy, the implementation partners helped identify and recruit participants for the survey following the supply and demand operational frameworks developed by the research team. The total sample size of the study was 317. The sample for Phase 2 consisted of 60 participants (35 demand and 25 supply) from which data was collected through semi-structured interviews or focus group discussions. Phase 3 relied on a larger sample of 317 respondents who completed the mirror questionnaires. Figure 5 provides additional details about the location of data collection activities. Since the goal of the report is to provide a summary of key research findings, the following sections of this document will focus on the results from Phase 3 of the study.

Figure 5 – Map of Study Sites

Research Phase	Demand-Side	Supply-Side	Total
Phase 2	35	25	**60**
Phase 3	168	149	**317**
Total	**203**	**174**	**377**



As Figure 6 shows, sampling efforts were successful in identifying a diverse group of smallholder farmers across the Western Highlands. There was a 60:40 proportion of male respondents, while most participants were above the age of 40 (64%). As expected, 57% of all farmers interviewed had primary education, which is characteristic of that population in the region.[43] Ninety-one percent of participants lived and worked on plots of land smaller than two hectares. Figure 7 describes some key characteristics of the supply-side sample, which included a diverse group of professionals from the private, public, and nonprofit sectors. As expected, this group tended to have higher educational levels, was predominantly male (72%), and younger (44% between 25-39 years old).

[43] Ibid (Govt. of Guatemala (2011)

Figure 6 – Selected Characteristics of the Demand-side Sample

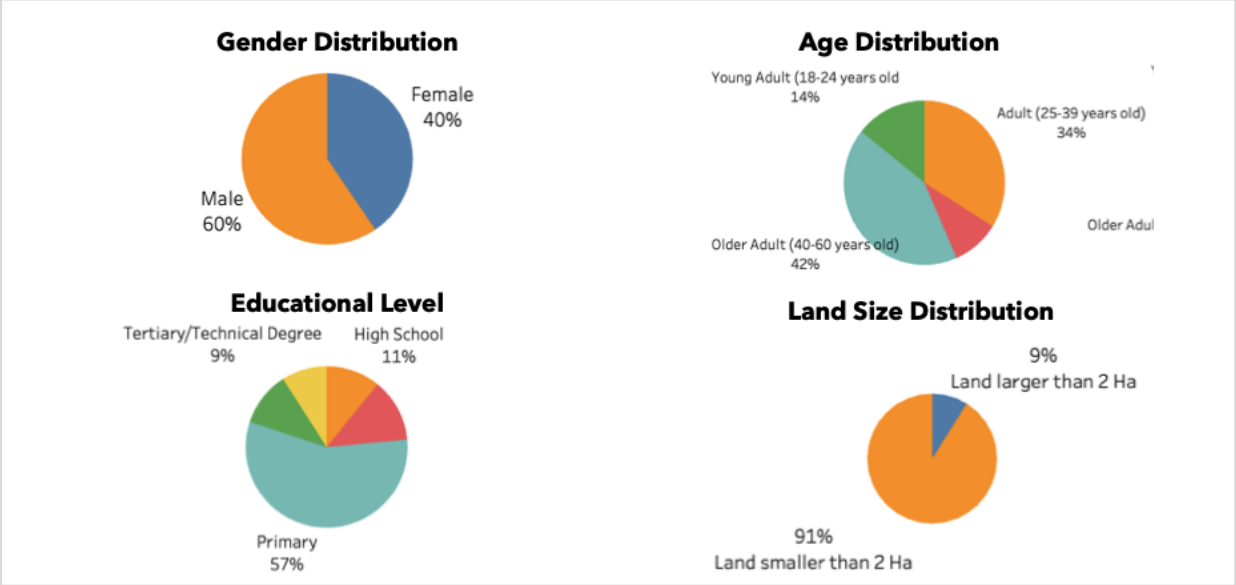
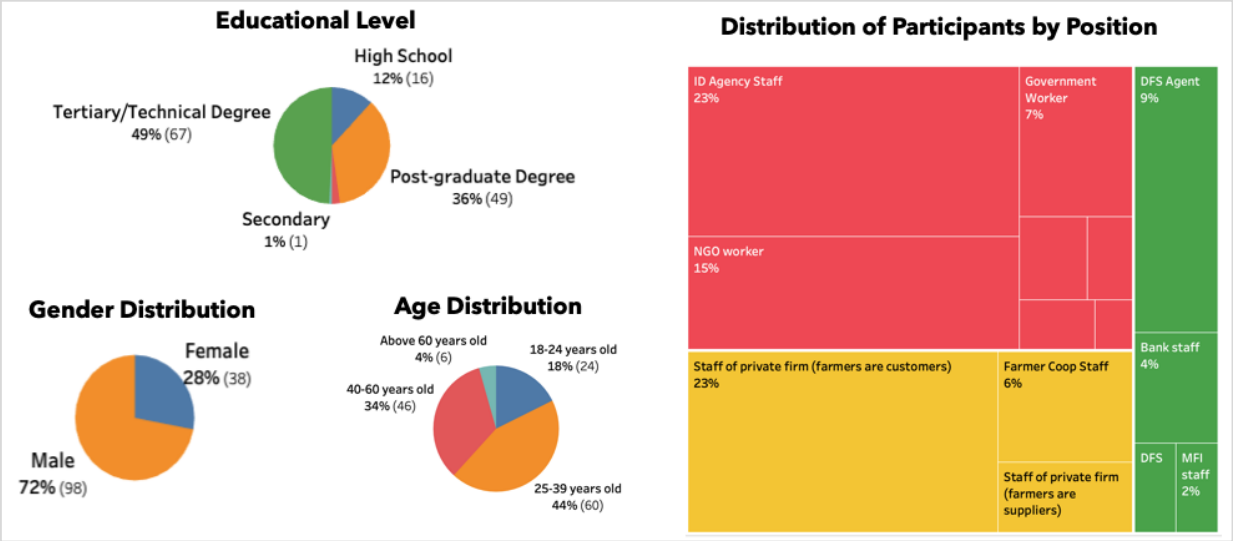


Figure 7 – Selected Characteristics of the Supply-side Sample



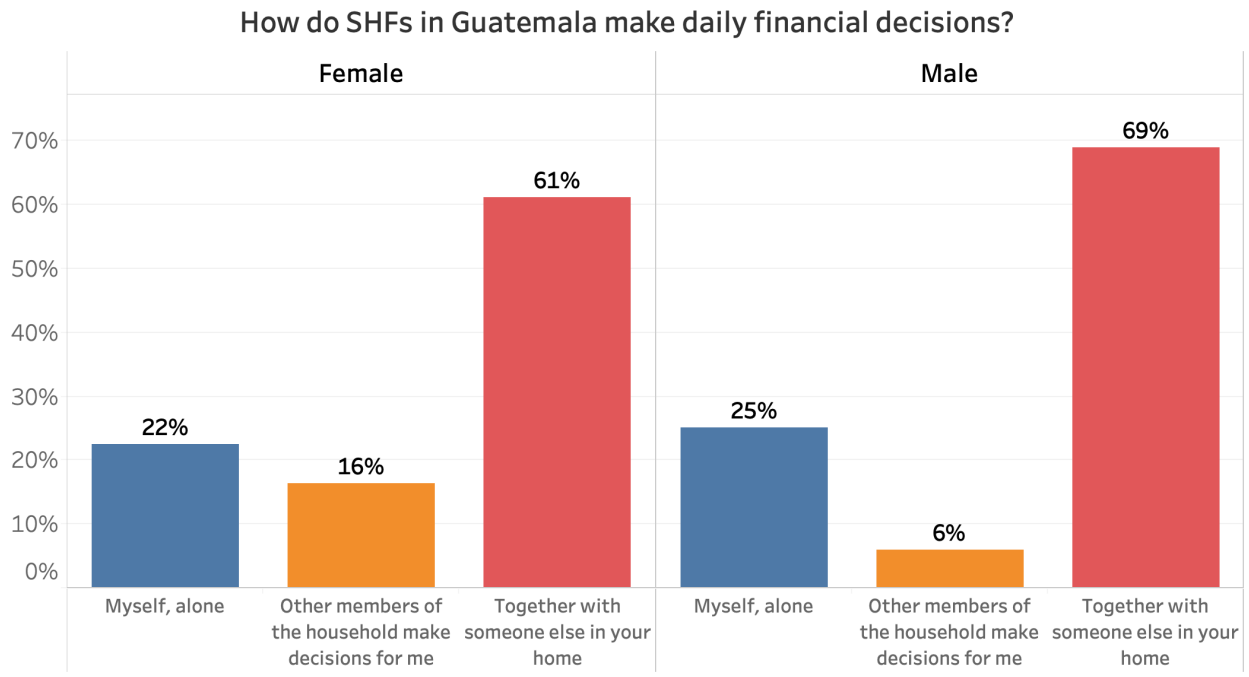
3.2. Six Key Findings for Guatemala

The preliminary analysis of Phase 3 data produced six relevant findings for policy makers and project implementers in Guatemala. Such findings are summarized in the following sections.

3.2.1. Financial decisions are made jointly by household members

As Figure 8 shows, most smallholder farmers interviewed in Guatemala indicated that they make daily financial decisions together with other household members - 69% of male, and 61% of female respondents. This pattern continues largely consistently along gender lines regarding the proportion of respondents who reported making decisions alone (25% male and 22% female). Finally, the proportion of women indicating that other household members make daily financial decisions for them is higher than their male counterparts (16% vs 6%, respectively). These numbers indicate that both DFS-related research, programs, and projects could benefit from targeting households instead of individuals.

Figure 8 – How SHFs Make Daily Financial Decisions

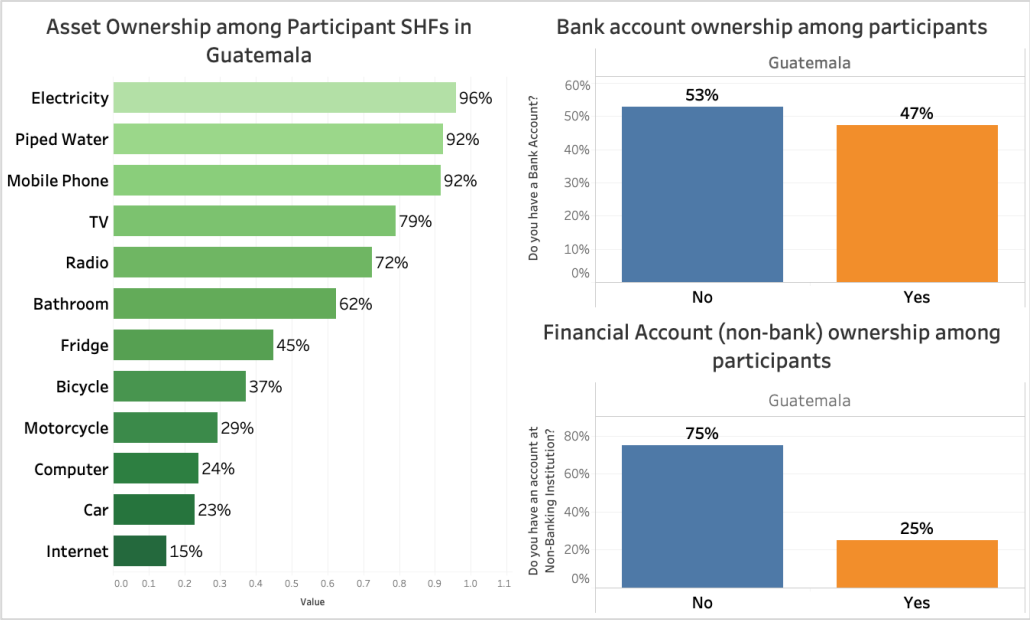


3.2.2. Financial inclusion: lower than digital inclusion

Figure 9 provides three measures of financial and digital inclusion. In terms of bank accounts, 43% of respondents indicated that they had access to a bank account, while only 23% held an account in a non-bank financial institution, such as a microfinance organization. On the other hand, the overwhelming majority of smallholder farmers interviewed owned mobile phones (92%). The level of digital inclusion (measured by phone ownership) is especially significant given the fact only 62% of survey participants have a household with a toilet and 45% have a refrigerator

in their homes. As such, the widespread ownership of mobile phones among smallholder farmer suggests an opportunity for future policies and projects to expand financial inclusion through digital means.

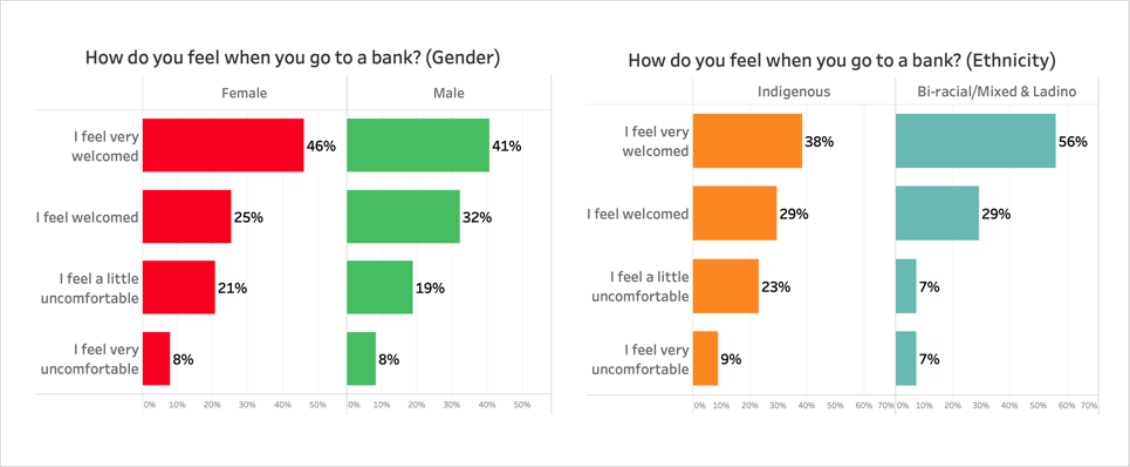
Figure 9 – Comparative Levels of Financial Inclusion vs. Digital Inclusion



3.2.3. Comfort level at formal financial institutions reveal little difference by gender, but larger difference by ethnicity

Figure 10 provides evidence on the experience of different smallholder farmer groups when they go to a bank. Most participants have a positive experience, but there are important variations in terms of gender and ethnicity. In Figure 10, on the left side, male and female respondents display a similar pattern when reporting how they feel when they go to a bank. Seventy-one percent of male respondents feel welcomed or very welcomed, while 73% of female respondents feel the same way. However, the figures on the left side indicate a different situation when it comes to ethnicity: while 32% of indigenous participants said they feel a little or very uncomfortable when they go to a bank, only 14% of non-indigenous reported the same experience.

Figure 10 – SHF Experience at a Bank, Disaggregated by Gender and Ethnicity



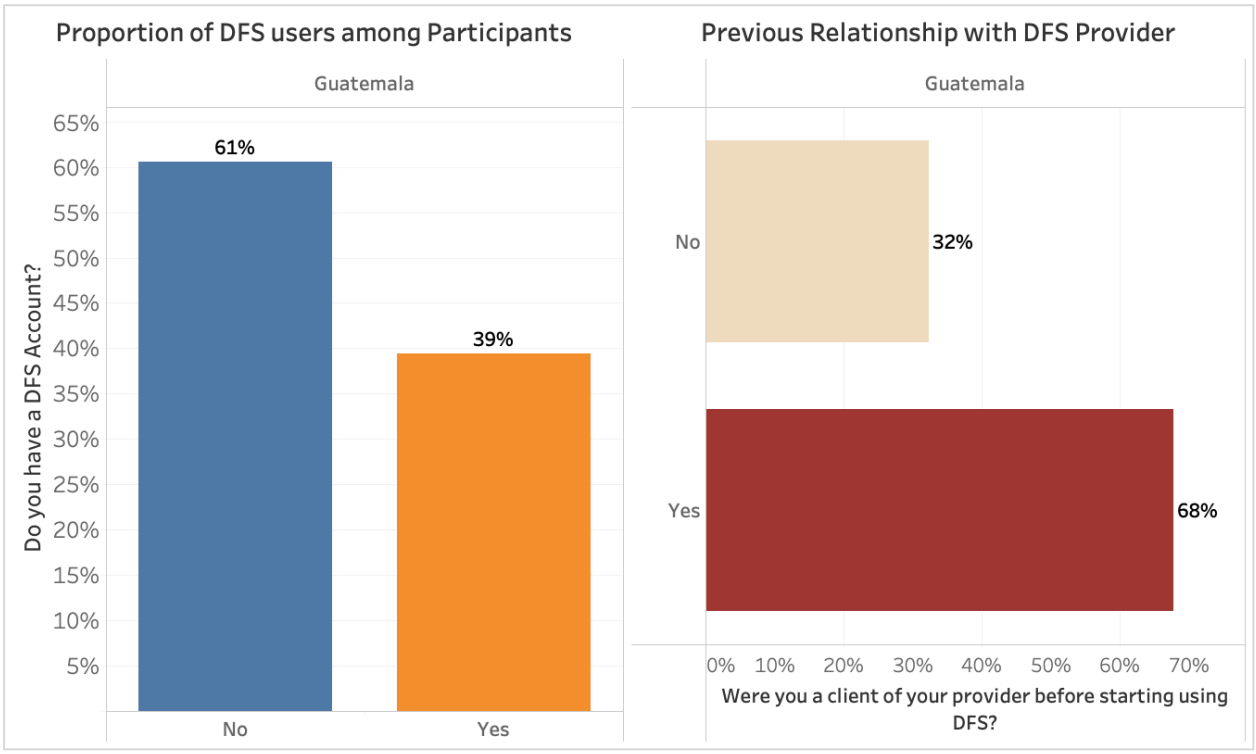
Such numbers highlight the need for future interventions to look beyond bank account ownership and usage, including alternative factors influencing SHFs' decision to join the formal financial system. User experience at banks is one indicator showing that indigenous populations can face cultural and social barriers that influence their willingness to trust financial institutions with their resources.

3.2.4. Existing relationship with DFS providers tends to precede DFS use

As Figure 11 shows, the proportion of survey participants who are DFS users is relatively small: only 39% of smallholder farmers interviewed identified as such. At the same time, the graph on the right side shows that among DFS users, 68% of them had a previous relationship with their DFS provider. This was the case, for example, of many TIGO (the largest provider of mobile phone services in Guatemala) clients that over time also started to use TIGO Money (the company's DFS service). At least two lessons can be drawn from these indicators. First, incumbent telecommunication and financial companies have an opportunity to leverage the trust of existing clients if they choose to start offering digital financial services.[44] Second, new entrants into the DFS market in Guatemala may face difficulties in attracting SHFs, given that they must find alternative ways of building trust or create incentives that speak directly to this type of client.

[44] As of 2018, TIGO, for example, had roughly 54% market share in Guatemala. More information at: https://www.millicom.com/media/3398/comcel-trust-mda-q1-2018.pdf; and https://www.commsupdate.com/articles/2019/01/25/america-movil-acquires-telefonica-assets-in-guatemala-el-salvador-for-usd648m/

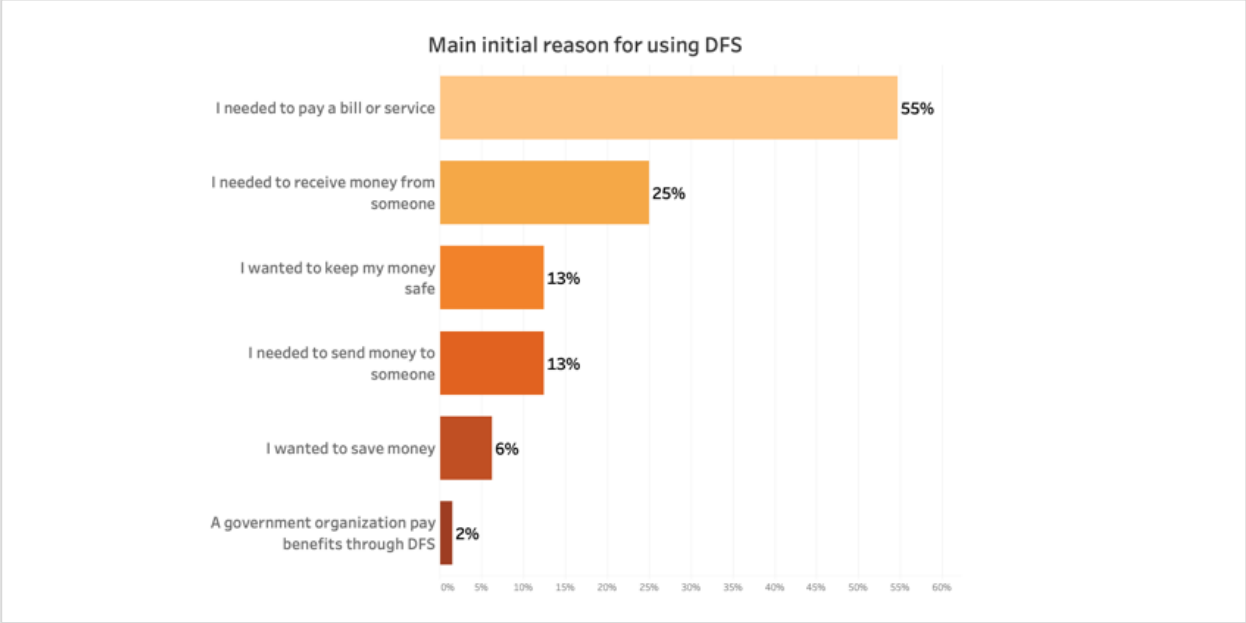
Figure 11 – DFS Use among SHFs and their Relationship with DFS Providers



3.2.5. Necessity: the mother of adoption

Figure 12 displays a clear pattern among the smallholder farmers interviewed for the survey relative to their initial incentives to start using digital financial services: 55% needed to pay a bill or service and took advantage of the fact that they could perform the transaction digitally. The second most prevalent reason for DFS use was to receive money transfers (25%), followed by sending money transfers (13%), and keeping their money safe (13%). Only 6% of respondents indicated having joined DFS because it would allow them to save money, indicating that the appeal of such services to existing customers is not cost-related. At the same time, only a small number of respondents (2%) indicated having joined DFS to receive government benefits, which could be consistent either with a low adoption of digital services by government organizations in Guatemala and/or a low level of penetration of this type of service among smallholder farmers. In any case, these results show that there is space for top-down or supply-led initiatives to expand DFS to smallholder farmer populations, instead of a more hands-off approach such as waiting for the demand to grow organically in the Western Highlands.

Figure 12 – Motivation for DFS use among Smallholder Farmers

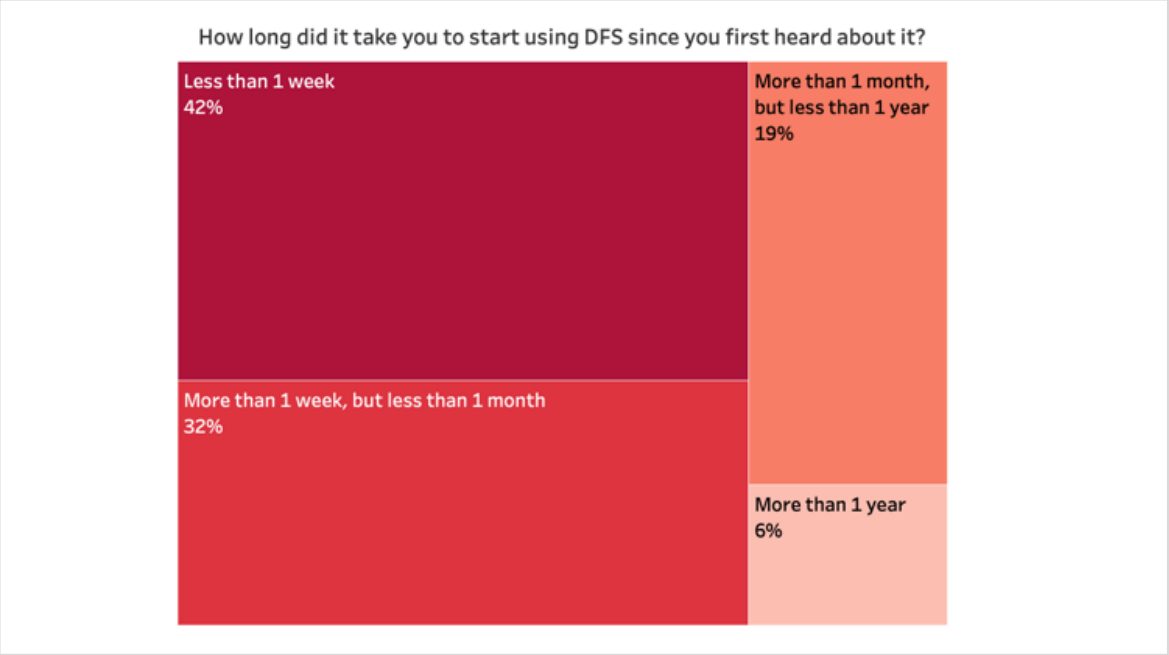


3.2.6. Onboarding DFS use is quick

Figure 13 describes how long it took for current DFS users from becoming aware of digital financial services to starting to use them. For 42% of customers, it took less than a week, whereas 32% indicated it took between one week and one month. Nineteen percent started using DFS in one month to one year, and only 6% did so after one year. These numbers indicate that, at least among the 39% of smallholder farmers that became DFS users, there was a high degree of willingness to adopt digital services once they became aware of them.

One of the potential explanations for the short time between awareness and adoption can be found in Figure 11, which showed roughly two-thirds of DFS users having a previous relationship with their providers when they started to use their services. The existence of a relationship of trust between firms and clients can favorably dispose clients to new services from that same company.

Figure 13 – Relationship between DFS Awareness and Use among SHFs



3.3. Preliminary Results of the Comparative Analysis: Four Key Comparative Findings of Guatemala & Senegal

In addition to the results specific to Guatemala, the study produced additional findings based on the comparison of the data produced in Guatemala and the survey conducted in Senegal. As mentioned in the beginning of this report, notwithstanding their different historical, social, and geographical characteristics, there are some structural similarities that make such a comparison useful for both countries as a reference against which they can assess their own performance. For example, the presence of a large population of low-income smallholder farmers encouraged local and international agencies to promote DFS as a scalable path for financial inclusion in both countries.[45] Yet, their experiences defied expectations about DFS adoption for opposite reasons. Guatemala, which in theory had all the preconditions for a successful expansion of DFS, has struggled to expand DFS adoption and use (see Table 7). Senegal, on the other hand, has made substantial progress in the last decade, in spite of much poorer socioeconomic conditions and weaker digital and financial infrastructure (see Table 8). Such apparent contradictions indicate that the expansion of DFS use among smallholder farmers may be influenced, but not entirely determined by the preexisting social, economic, and political contexts of each country.

[45] World Bank Development Indicators. Available at: https://data.worldbank.org

Table 7 – Selected Socioeconomic and DFS Infrastructure Indicators for Guatemala and Senegal [46]

Selected Indicators	Year	Guatemala	Senegal
Socio-economic indicators			
Population (Total), in millions	2017	16. 9	15.9
Population (Rural), in millions	2017	8.3	8.4
GDP per capita, PPP (current international $)	2017	8,150	2,712
Poverty headcount ratio at $3.20 a day (2011 PPP) (% of population)	2014/2011	24.0	67.0
Literacy rate, adult total (% of people ages 15 and above)	2013	77.0	43.0
Access to electricity, rural (% of rural population)	2016	86.0	38.0
Digital Infrastructure Indicators			
Secure Internet servers (per 1 million people)	2017	68.2	8.6
Mobile cellular subscriptions (per 100 people)	2017	118.0	99.0
Fixed broadband subscriptions (per 100 people)	2016	3.1	0.6
Financial Infrastructure Indicators			
Credit registry coverage (% of adults)	2018	17.5	0.6
Commercial bank branches (per 100,000 adults)	2016	33.0	5.0
Automated teller machines (ATMs) (per 100,000 adults)	2016	36.0	6.0

Table 8 – Selected DFS Indicators for Guatemala and Senegal [47]

Selected Indicators	Year	Guatemala	Senegal
Mobile Money account ownership, Total (% age 15+)	2017	2.1	20.9
Mobile Money account ownership, Rural (% age 15+)	2017	1.7	19.5
Sent or received domestic remittances through a mobile phone (% age 15+)	2017	1.1	31.0
Used a mobile phone or internet to access an account, Total (% age 15+)	2017	4.5	29.4
Used a mobile phone or internet to access an account, Rural (% age 15+)	2017	4.1	26.3

[46] All data retrieved from the World Bank Development Indicators. Available at: https://data.worldbank.org

[47] All data retrieved from the World Bank Development Indicators. Available at: https://data.worldbank.org

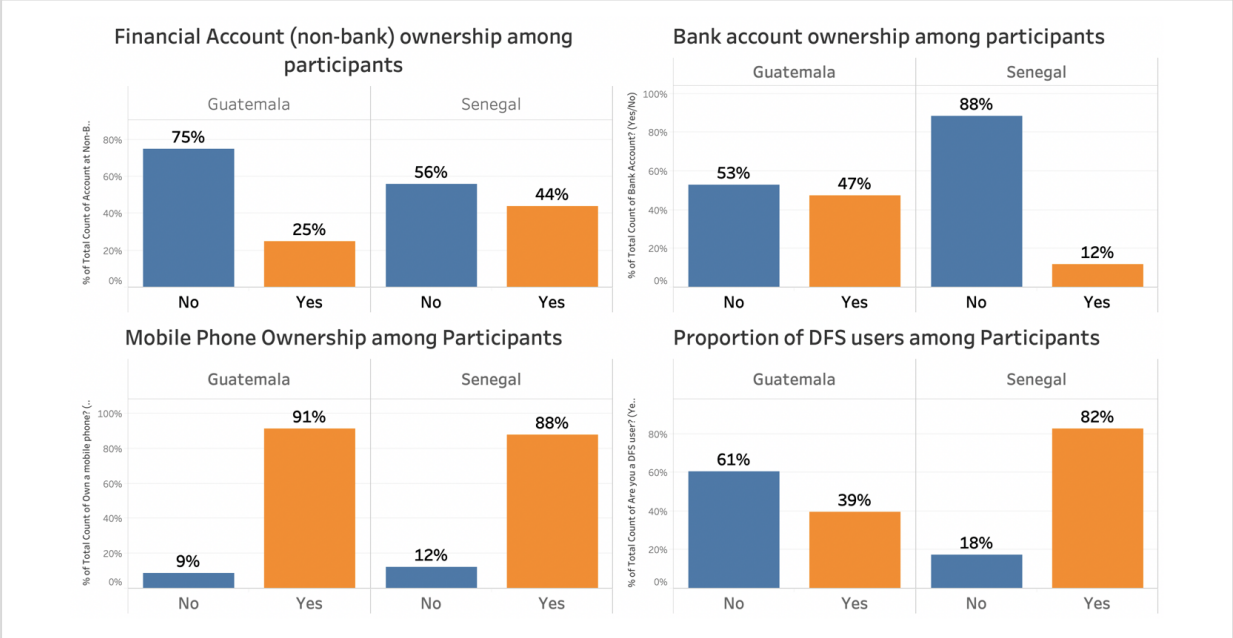
Used the internet to pay bills in the past year, Total (% age 15+)	2017	4.0	9.0
Used the internet to pay bills in the past year, Rural (% age 15+)	2017	3.1	5.1

As a way to confirm the validity of the comparison between the two countries, Figure 14 tries to replicate the patterns described in Tables 7 and 8 using data from the study sample (see Table 9 for details of the sample in each country). The numbers show that, indeed, similar conditions were identified among the SHFs interviewed in both countries. Bank account ownership in Guatemala (47%) is significantly higher than in Senegal (12%), although Senegalese SHFs reported having more accounts in non-financial institutions (such as microcredit) when compared to Guatemalans (44% and 25%, respectively). In terms of digital inclusion, the proportion of Guatemalan SHFs who have a mobile phone is slightly higher than their Senegalese counterparts (91% and 88%). Finally, DFS use in Senegal among the survey participants is more than two times what is observed in Guatemala (82% and 39%).

Table 9 – Sample Characteristics for Guatemala and Senegal

Research Phase	Demand-Side	Supply-Side	Total
GUATEMALA			
Phase 2	35	25	**60**
Phase 3	168	149	**317**
Total	**203**	**174**	**377**
SENEGAL			
Phase 2	47	12	**59**
Phase 3	438	145	**583**
Total	**485**	**157**	**642**

Figure 14 – Key data from the study sample

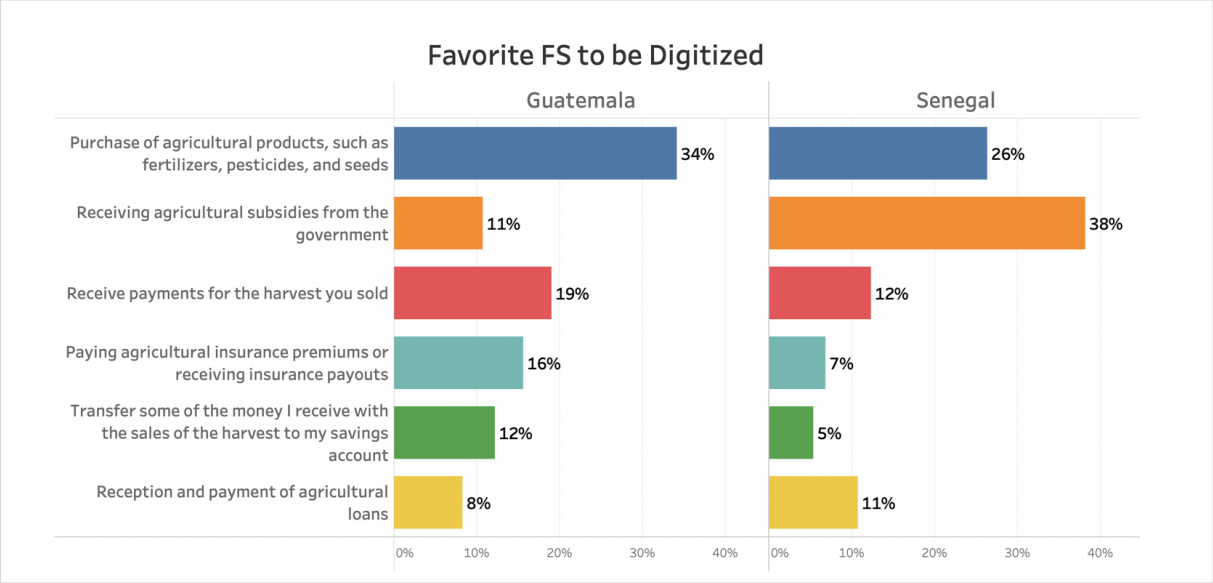


Having confirmed the comparability between the macro-level data and the study sample data, in the following sections of the report, we highlight some of the lessons Guatemala can draw from the Senegalese experience. All the findings remain exploratory and need to be further confirmed by additional evidence. Yet, based on the comparative analysis produced so far, there are at least four key relationships that merit closer attention from researchers and policy makers in Guatemala.

3.3.1. DFS can strengthen the relationship between the government & SHFs

Figure 15 shows the preferences of Guatemalan and Senegalese smallholder farmers relative to six types of financial services that they would like to be digitized the most. The most popular choice among Guatemalan SHFs (34%) was purchasing agricultural inputs through digital means, but their overall preference was relatively well distributed among the other options: receiving payments for harvest sold (19%), paying for insurance premiums (16%), transfers to savings account (12%), receiving agricultural subsidies (11%), and paying or receiving loans (8%). However, in Senegal, there was a more skewed preference for receiving subsidies from the government (38%) and purchasing agricultural inputs (26%), which roughly represents the choice of two-thirds of all SHFs surveyed in the country.

Figure 15 - Financial Services SHFs in Senegal and Guatemala Would Like to be Digitized the Most



Given that in both countries, researchers interviewed farmers with a similar profile, this large difference, especially in terms of favoring the digitization of government benefits, may reflect more than a personal or cultural preference. Senegal has historically invested in agricultural policies that include a range of direct subsidies to SHFs,[48] thereby creating with each of them an opportunity for digitization and expansion of DFS as a whole. In Guatemala, on the other hand, the existence of such direct subsidies is relatively small, which reduces the ability of the local public sector to leverage these transactions in an effort to expand digital services.[49,50] Should the local government choose to implement or expand policies such as fertilizer vouchers, or conditional cash transfers to smallholder farmers in the Western Highlands, the Senegalese example indicates that DFS could also be included as a useful tool.

3.3.2. The sequencing of financial and digital inclusion efforts may affect DFS adoption

Another interesting hypothesis emerging from the comparison between Guatemala and Senegal data is related to the factors leading to different DFS adoption rates in each country (39% and 82%, respectively). As Figure 16 shows, it was particularly surprising to find such a high proportion of DFS users in Senegal when 62% of all SHFs interviewed in that country had never been to a bank before – compared to only 2% in Guatemala.

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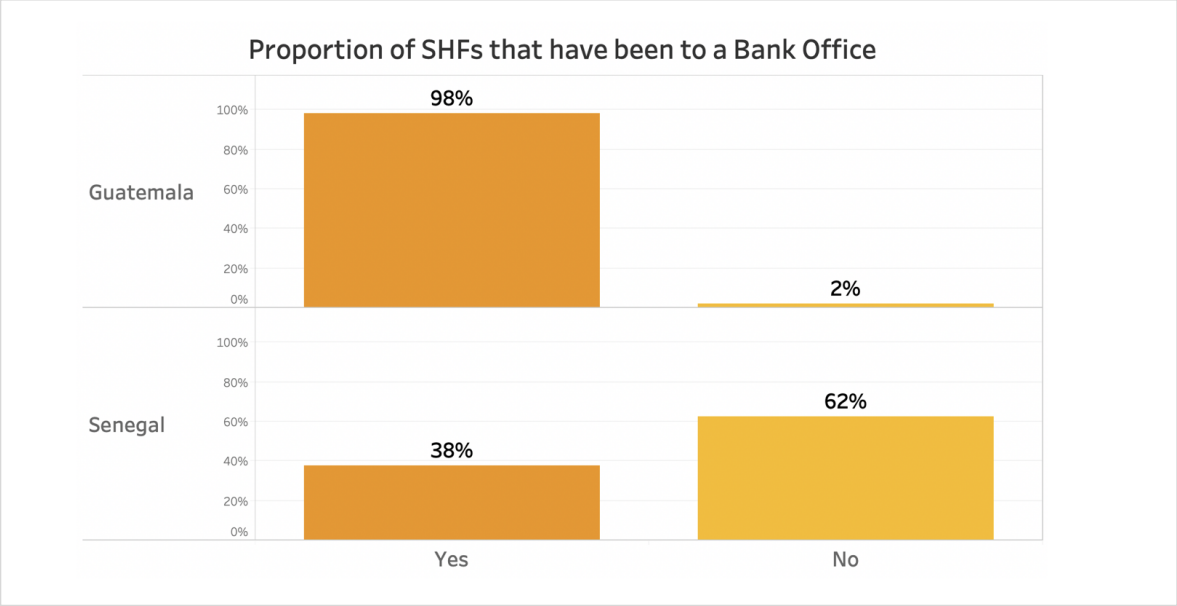
[48] Seck, A. (2017). Fertiliser subsidy and agricultural productivity in Senegal. The World Economy, 40(9), 1989-2006.

[49] Aguilar-Støen, M., Taylor, M., & Castellanos, E. (2016). Agriculture, Land Tenure and International Migration in Rural Guatemala. Journal of agrarian change, 16(1), 123-144.

[50] Holland, M. B., Shamer, S. Z., Imbach, P., Zamora, J. C., Moreno, C. M., Hidalgo, E. J. L., ... & Harvey, C. A. (2017). Mapping adaptive capacity and smallholder agriculture: applying expert knowledge at the landscape scale. Climatic Change, 141(1), 139-153.

Figure 16 – Proportion of SHFs in Guatemala and Senegal that had been to a Bank



As previous research on technology adoption by farmers suggests,[51] a prior relationship with banks may have contributed to a bias in the perception of SHFs about the risks and benefits of DFS. In other words, the fact that most smallholder farmers in Guatemala had already seen how a traditional financial service provider works in person could have created assumptions about the added risk of digital financial services that most Senegalese did not have.

Indeed, as Figure 17 shows, Guatemalan SHFs already have a higher degree of distrust in financial institutions than their Senegalese counterparts. Yet, as it can be seen in Figure 18, when asked which type of financial organization they feel the most comfortable using, they consistently chose banks over microfinance institutions or digital financial services. From the data, it is possible to draw a scenario in which Guatemalan farmers are already aware of the risk of engaging with financial organizations of any kind, and are aware that doing so via digital mechanisms is even riskier. On the other hand, in Senegal, farmers already have a more positive view of financial institutions (perhaps because they have never been to a bank in person), which makes the risks associated with DFS lower in comparison.

[51] Wyche, S., & Steinfield, C. (2016). Why don't farmers use cell phones to access market prices? Technology affordances and barriers to market information services adoption in rural Kenya. Information Technology for Development, 22(2), 320-333.

Figure 17 – Trust in Financial Institutions in Senegal and Guatemala [52]

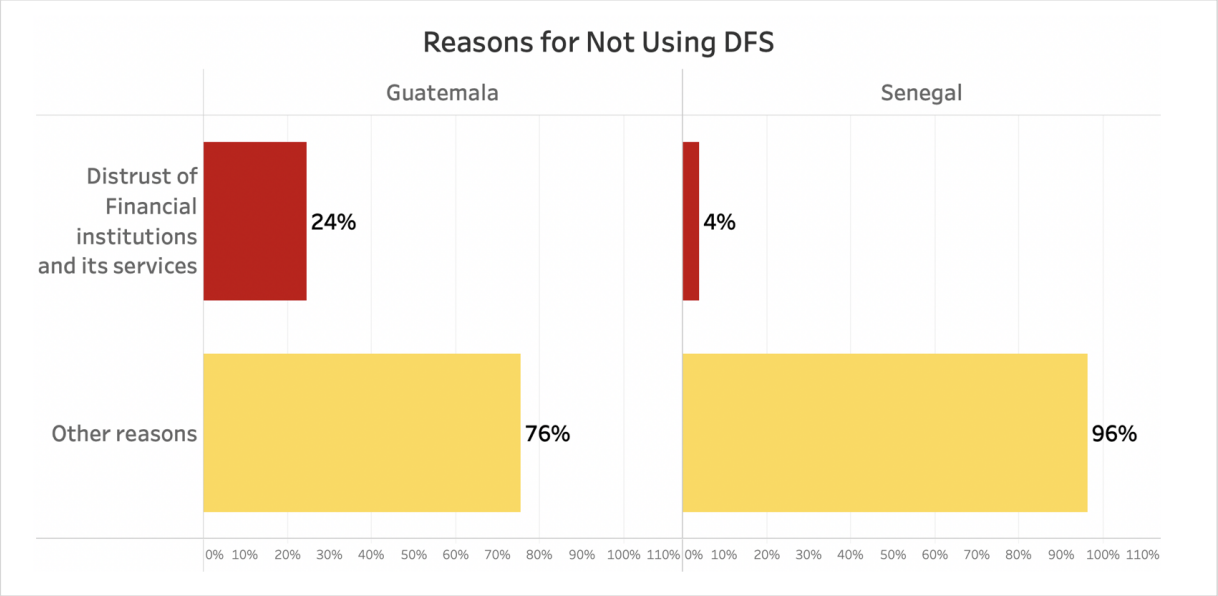
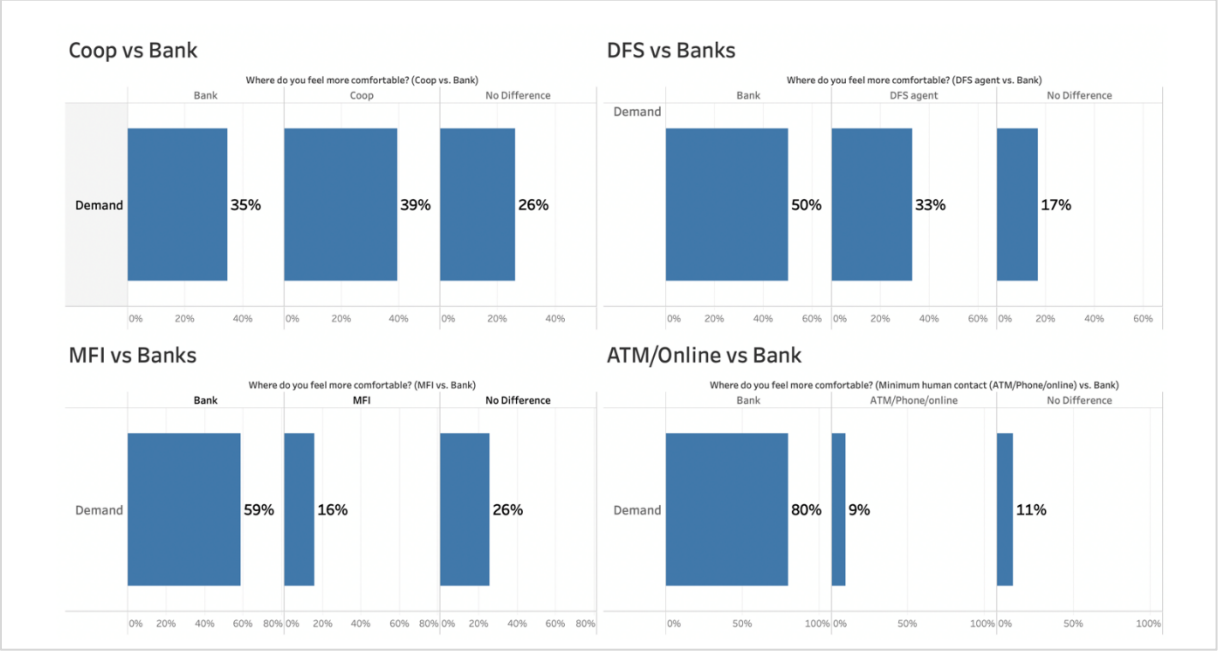


Figure 18 – Where and How SHFs in Guatemala Feel Comfortable Using Financial Services



[52] Other reasons for not adopting DFS in Guatemala include i) Network coverage is unreliable where I live, ii) I am afraid of fraud, iii) There are no agents near me; iv) DFS is expensive; v) I don't have the required documents; vi) Someone else in my household already has an account; vii) I don't know how DFS works; viii) DFS are not useful to me; ix) I don't have enough money; x) Other. For Senegal, the other reasons include i) I don't know how DFS works; ii) DFS are not useful to me; iii) I don't have enough money; iv) DFS is expensive; v) There are no agents near me; vi) and I am afraid of fraud; among others.

3.3.3. High levels of digital and financial inclusion seem to be relevant to DFS adoption only after SHFs trust the financial system

In addition to the different levels of trust in financial institutions observed in Senegal and Guatemala, the survey data also provide clues about the conditions under which SHFs overcome their reticence and start using digital financial services. Figure 19 displays the proportion of DFS users in both countries who had a previous relationship with their DFS provider: 68% in Guatemala and 54% in Senegal. At the same time, Figure 20 shows the time SHFs took to start using DFS after becoming aware of it, revealing that 75% of survey respondents in Guatemala took a month or less to become users, while in Senegal 65% took over one year.

Figure 19 – Previous relationship between DFS Users and Providers in Guatemala & Senegal

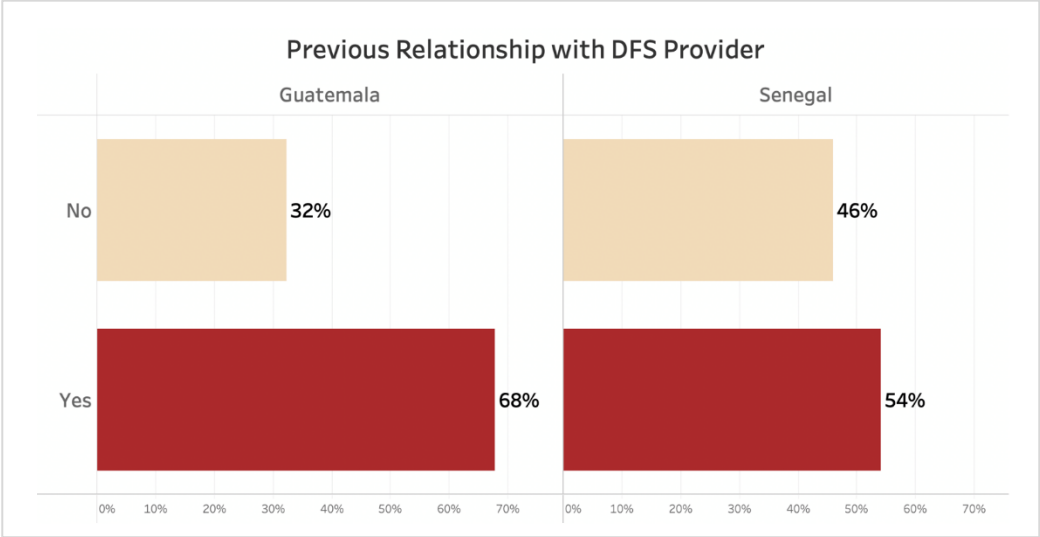
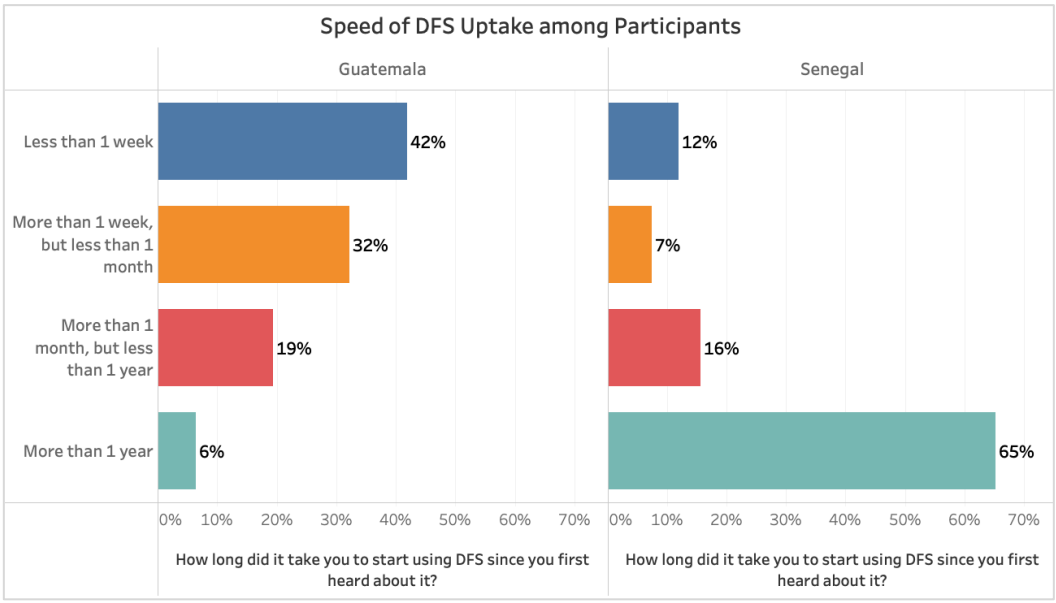


Figure 20 – Speed of DFS Uptake in Guatemala & Senegal



Taken together, one plausible scenario derived from this evidence is that Guatemalan SHFs trust their financial institutions less, but if they have a preexisting relationship with a company that offers DFS, they are more likely to start using these services fast. In Senegal, SHFs trust their financial institutions to relatively greater degree and are more open to start using DFS even when they are not a current client of the company that offers the service. However, these same farmers are less eager to quickly become DFS users, taking longer to assess the risks and benefits of performing financial transactions through digital means. These scenarios suggest that each context requires a specific strategy to build trust in the DFS system, and in the Guatemalan case, incumbent providers seem to play a critical role in expanding the DFS user base and include SHFs in the formal financial system.

3.3.4. Supply-side participants in Guatemala showed low expectations about SHF behavior, which are often mistaken

A final hypothesis emerging from the data concerns the relationship between perceptions of supply-side professionals about smallholder farmers and the assumptions they make when designing DFS interventions. Figure 21 shows a comparison in the responses of supply-side and demand-side survey participants in Guatemala and Senegal to a General Self-Efficacy Scale.[53] Yazdanpanah et al. (2015)[54] define self-efficacy as "the extent to which performance of a given behavior is easy or difficult for the individual, and/or a person's self-confidence in his/her ability to perform a behavior" (p. 403). The scale is a standard measure of self-efficacy applied in different populations in social sciences (including farmers), and consists of 10 questions, each with four possible answers: completely agree, somewhat agree, somewhat disagree, and completely disagree. Based on the answers to the questionnaire, a final score ranging from 10 to 40 is calculated by adding each response – worth between 1 (completely disagree) and 4 points (completely agree).[55] Higher scores signify higher self-efficacy, which is a proxy for assessing how confident SHFs are on their capacity to deal with new circumstances in their lives, including the ability and/or willingness to adopt new technologies such as DFS.

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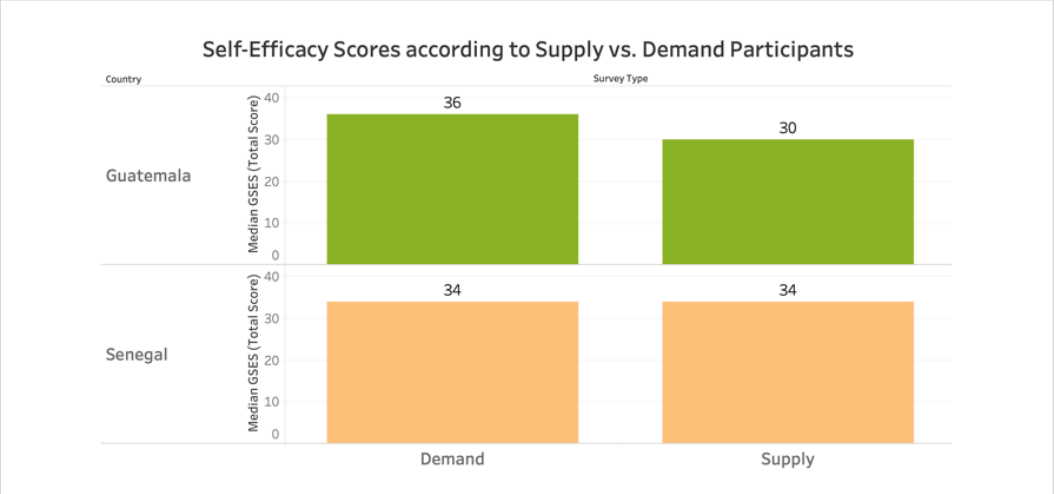
[53] Luszczynska, A., Gutiérrez-Doña, B., & Schwarzer, R. (2005). General self-efficacy in various domains of human functioning: Evidence from five countries. International journal of Psychology, 40(2), 80-89.

[54] Yazdanpanah, M., Feyzabad, F. R., Forouzani, M., Mohammadzadeh, S., & Burton, R. J. (2015). Predicting farmers' water conservation goals and behavior in Iran: A test of social cognitive theory. Land Use Policy, 47, 401-407.

[55] Wu, H., & Mweemba, L. (2010). Environmental self-efficacy, attitude and behavior among small scale farmers in Zambia. Environment, Development and Sustainability, 12(5), 727-744.

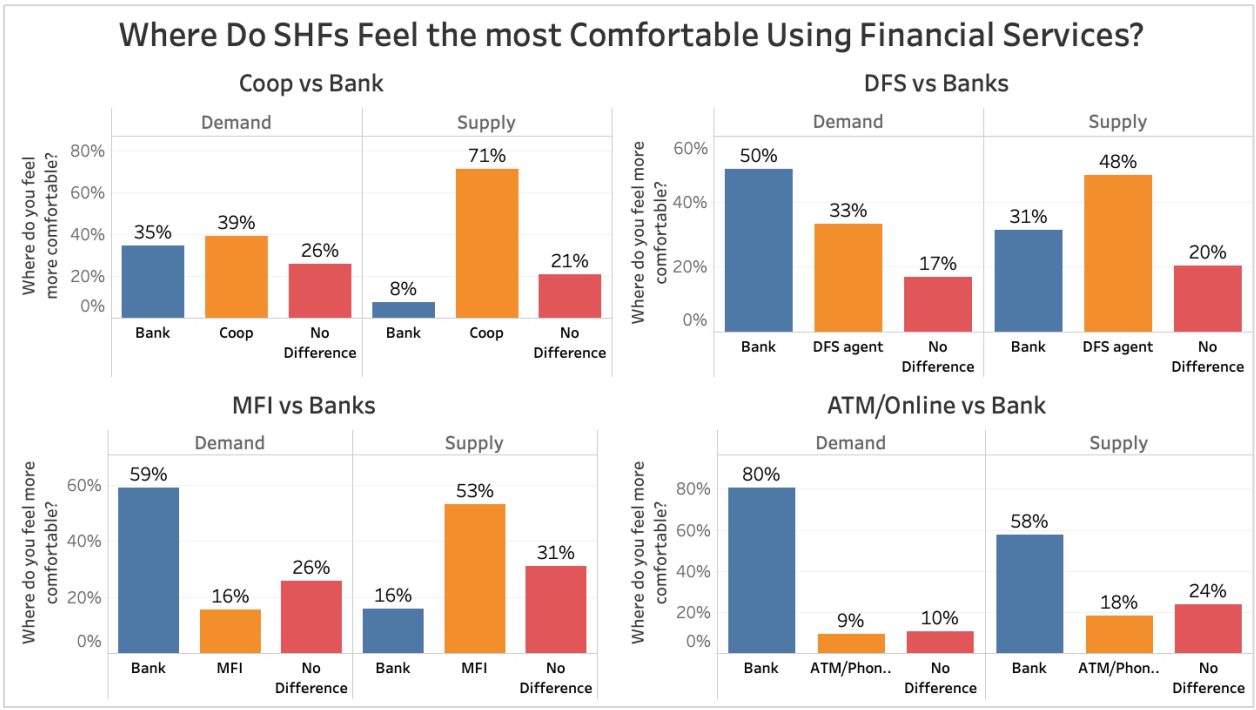
Figure 21 – Actual vs Expected Self-Efficacy among SHFs in Guatemala & Senegal



The median scores displayed in Figure 21 show that supply- and demand-side survey participants in Senegal have the same level of confidence on SHFs self-efficacy (34), while supply-side respondents in Guatemala consistently underestimated SHFs self-efficacy levels (expected 30, when farmers reported 36). Low expectations exist about the possibility of smallholder farmers' behavior, which can have important consequences for program design, such as curbing decision-makers' willingness to implement DFS interventions on a larger scale due to fear of low demand.

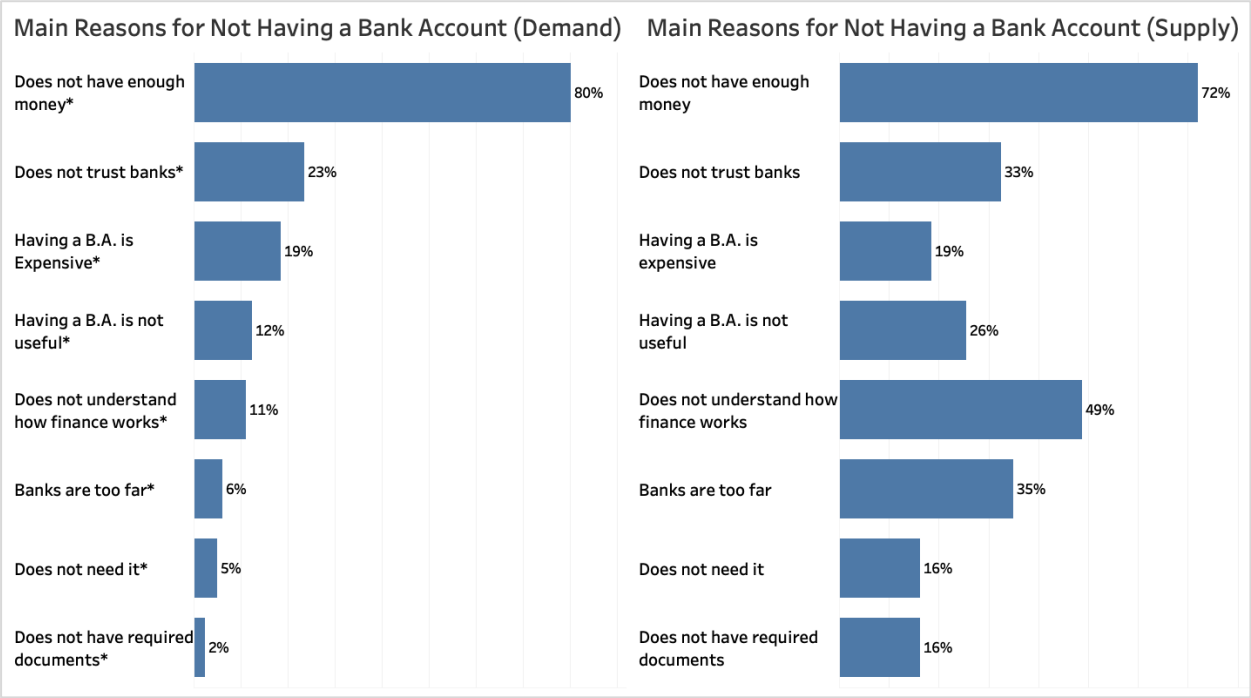
Two additional pieces of evidence are consistent with the hypothesis that low expectations about smallholder farmers may lead to biased assumptions about their behavior from professionals in the supply-side that design and implement DFs interventions. Figure 22 shows that supply-side survey respondents consistently underestimated how much SHFs feel more comfortable at banks vis-a-vis other financial institutions such as MFIs (supply-side expected preference was 16% against 59% from SHFs actual preference), Cooperatives (8% against 35%), DFS (31% against 50%), and ATM/Online Banking (58% against 80%). One potential consequence of such mismatch of perceptions is the establishment of DFS initiatives that underestimate the importance of banks in how SHFs participate in the formal financial system.

Figure 22 – Actual vs. Expected Level of Comfort among SHFs Using Financial Services in Guatemala



Alternatively, Figure 23 presents supply-side expectations versus SHFs actual response to why some of them do not have a bank account. Although both sides identified the lack of financial resources as a key disincentive for owning a bank account, supply-side respondents expected 49% of farmers would indicate the lack of knowledge about how finances work as another important barrier to financial inclusion. Yet, only 11% of SHFs interviewed indicated financial literacy as a factor influencing their decision not to have an account. Once again, such misperception can lead to a distorted resource allocation towards financial literacy programs when it is also important to develop mechanisms that facilitate the recruitment of low-income individuals into the formal banking system.

Figure 23 – Actual vs. Expected Motivations among SHFs for not having a Bank Account in Guatemala



4. CONCLUSIONS & RECOMMENDATIONS

Through the research, the team identified several key findings for Guatemala and specific recommendations. This section outlines the findings, recommendations, and the stakeholders who could potentially implement these recommendations.

First, financial decisions are often made in collaboration with other members of the household. Sixty-six percent of SHFs indicate that they make decisions together. It is important for providers and enablers to consider the needs and preferences of men and women, as well as the household unit. Thus, it is necessary to understand the local context and household dynamics before beginning to pilot a product or service. In the co-design workshop, one of the teams discussed the opportunity to create a family credit record that makes it easier for a family to access financial services as a unit.

The study also discovered that the comfort level of farmers at banks often varies by ethnicity; indigenous populations felt less comfortable in banks compared to mixed or Ladino groups. Providers, enablers, and conveners could consider addressing this challenge with sensitivity training and alternative delivery/service options aimed at reducing bias towards farmers with an indigenous background.

The research also found that financial inclusion is less prevalent than digital inclusion in Guatemala, which demonstrates that mobile phone penetration is not necessarily associated with an uptake of DFS. Providers, enablers, and conveners need to know that although access to a

mobile phone may remove technical barriers to engaging with DFS, they must also articulate a clear value proposition for farmers and establish trust. In Guatemala, if farmers have a previous relationship with an institution that they trust, then they are more likely to adopt DFS. Sixty-eight percent of DFS users had a previous relationship with their provider. Thus, providers and enablers need to generate mechanisms to develop relationships with farmers and build trust if they want to encourage the use of DFS. Two of the groups in the co-design workshop emphasized that there is a need to better understand the local context and distrust of financial institutions and DFS.

Once a relationship has been established with a service provider, farmers in Guatemala are more likely to adopt DFS quickly (in less than one month for 42% of customers and one week to one month for 32%). Thus, it is important that providers and enablers invest in relationships with farmers. Marketing and sales strategies targeting farmers can speed up the expansion of DFS usage in the country.

DFS participants often adopted DFS out of necessity. Fifty-five percent of DFS users indicated that they adopted DFS to pay a bill or service. Thus, if providers and enablers could collaborate with the private sector on DFS programs, then farmers may be more likely to use it.

Finally, in Guatemala, there was a disconnect between the perceptions that the providers, enablers, and conveners had of the farmers and the barriers to adoption. For the farmers, they were most concerned with trust and wanted better/cheaper financial services, whereas the supply-side actors perceived financial and/or digital knowledge to be the largest barrier. This issue was addressed in the co-design activities, as one team indicated the need for more research to better understand the needs, preferences, and barriers to adoption as well as working directly with farmers to generate relevant solutions.

This report provides an overview of the key findings. Although additional data are available, the results will be shared in subsequent publications. However, the initial research questions have been addressed in this report as well.

- Research question 1 (how can DFS address unmet financial needs of SHFs): the report highlights that digitizing purchases for agricultural inputs and payments for crops are likely the most useful for farmers in Guatemala. The report also shows that farmers are more likely to use DFS to pay a bill or service.
- Research question 2 (conditions for DFS adoption): this report demonstrates that trust is an important component for adoption DFS, farmers often adopt DFS out of necessity, additional education on the benefits of DFS may be required, and it may be beneficial to target households rather than individuals.
- Research question 3 (perception of farmer needs, DFS availability, and incentives and barriers to use by supply and demand side actors): the comparison of farmer expectations and preferences varied from the perceptions that the supply-side actors had about the farmers.

Through this work, additional questions arose:

- Why is there a misperception between farmers and supply-side actors related to farmer needs and capabilities? How might we address this issue?
- What are the farmers' needs, behaviors, and preferences and how could there be greater alignment with what the farmers need and the services offered?
- What is the experience of current DFS clients and how could the providers improve that experience?
- What are the best strategies and interventions for developing trust between SHFs and financial institutions?

5. RESEARCH DISSEMINATION AND CO-DESIGN ACTIVITY

The results and recommendations of the study were presented to Guatemalan stakeholders in two research dissemination events that took place on October 3rd and 4th, 2019. On the first day, representatives from USAID and MIT D-Lab led a Learning Event, where the researchers presented the results of the study to an audience composed of farmer groups, representatives of banking institutions, microfinance institutions, and telecommunications companies. The event represented an opportunity for researchers to share their findings with a wider audience and discuss ideas directly with the public (see Table A1).

On the second day, USAID and MIT D-Lab led a co-design workshop with a smaller group of key decision-makers in the Guatemalan DFS space so they could engage further with evidence produced by the study. The MIT D-Lab team introduced the event with a brief recap presentation of the results of the study, while the rest of the activities were led by *Link4*, a Guatemalan social enterprise with ties to D-Lab that specializes in the design and implementation of co-creation workshops (see Table A2).

The co-creation workshop included 40 people (15 women and 25 men), who worked in smaller, self-selected groups organized around the key findings of the study. Each group was assigned two findings and together they discussed how the evidence related to their own experience working with DFSs, as well as potential programs and/or activities they envisioned their organizations developing based on the findings. This closer engagement with key stakeholders represented a more meaningful research dissemination strategy because it allowed for extended reflection about the evidence produced. Furthermore, the event provided a networking opportunity for local DFS professionals who have limited opportunity to exchange ideas and network with their peers from other sectors and organizations. During the workshop, the participants also worked together in co-design teams to address five challenges identified through the research. They then worked together to generate an initial list of potential solutions (See Table 10).

Table 10– Challenges and Potential Mechanisms for Addressing Challenges

Challenge	**Potential Mechanisms to Address Challenges**
Overcoming the financial gap	-Educational programs at school, family, and community levels -Research studies to better understand SHF's needs to be able to offer targeted, differentiated services -Alignment of providers and enablers to provide better products and services
Generating trust	-Research studies and participatory workshops to better understand local community needs and context and reasons for distrust -Co-design activities to generate solutions that address the distrust -Benchmarking of similar projects/services being offered -A pilot program that addresses the lack of trust
Closing the gap between the real and perceived needs	- Additional research studies with SHFs to better understand their needs in a variety of locations -A platform co-designed by providers, farmers, and other stakeholders that allow banks to access necessary client information and farmers to access credit in a quick and reliable manner at appropriate times -A pilot program that provides opportunities for testing the platform
Diminishing the lack of trust of DFS	-Additional research studies to further understand the users and local context as barriers and reasons for distrust -Communication strategies to inform local leaders and organizations about DFS

Creating space to make financial decisions as a family	-A family credit record to enable families to more easily access financial services as a unit -Festivals to share information about DFS -Strategies to develop trust and improve communication -A pilot program to test solutions and gather feedback

***Content for this table was taken directly from the co-design workshop slides prepared by *Link 4.*[56]

A detailed description of the event's participants, activities, and outcomes can be found in a separate report prepared by Link4 and MIT D-Lab that was submitted directly to USAID.

6. POTENTIAL NEXT STEPS

In light of the positive outcomes documented in the study, as well as encouraging feedback received during and after the research dissemination events, the MIT D-Lab CITE research team believes there are tangible opportunities to further build what this project developed in Guatemala. In addition to the recent evidence produced by the study, there is a community of DFS-related organizations that are willing to start discussing the implementation of new technological solutions and/or support other research efforts that are relevant for the field.

For example, organizations like Popoyan and TIGO Guatemala are local organizations that were early backers of the project and demonstrated interest in developing follow-up activities. Popoyan is exploring ways to use mobile applications to engage with smallholder farmers such as finding the appropriate product design and engagement strategies. TIGO already has a large amount of data on their existing DFS clients but is looking for ways to expand their client base – possibly including more smallholder farmers – in the Western Highlands. One way for the company to achieve this objective is by learning more about the financial lives and behavior of their clients working in agriculture. Another option is to develop a better understanding of the experience of farmers that already use TIGO's DFS products and agents and use this information to create service strategies that fit their specific needs.

The examples cited above represent situations where MIT D-Lab CITE is both well-equipped and interested in continuing to work with local partners in the private sector to pursue mutually beneficial goals, and, more importantly, extend the benefits of DFS to smallholder farmers in the region.

[56] Link 4. (2019). Co-design sprint: financial inclusion of smallholder farmers in Guatemalan Highlands. Guatemala: Link 4

7. APPENDIX

Table A1 – DFS Learning Event Agenda in Guatemala

Time	Speaker	Activity
08:00	Registration	
08:30	Dr. Edwin Castellanos, Dean of the Instituto de Investigaciones, UVG.	Opening Remarks
08:35	USAID Guatemala Annie Wallace	Welcome Remarks
08:40	USAID/Washington Fernando Maldonado Alison Harrell	Official Event Opening
08:45	Arcenio Daza, Chemonics International	Colombia's Financial Inclusion Success Story
09:35	Coffee Break	
10:00	MIT/CITE Cauam Ferreira Cardoso	Presentation of the Results of the MIT Study
11:00	MIT/CITE Cauam Ferreira Cardoso	Open debate (implication for future programing, and public policy design)
11:30	USAID/Washington Fernando Maldonado Alison Harrell	Closing Remarks

Table A2 – DFS Co-Creation Workshop Agenda in Guatemala

Time	Activities
8:00	Registration
8:30	Welcome by USAID Icebreaker: Human Histograms Ground Rules and Goals Presentation of MIT D-Lab's Design Rhythm
9:00	LEARN Study findings presented by Cauam Cardoso
9:30	Team forming
9:45	IMAGINE

	In groups, share first impressions about the findings **Bi-association cards (first design activity)** **Crazy 8s (iteration)** **Selection of proposal to move forward (consensus)**
10:30	**Coffee Break**
10:55	**CREATE** **Poster to present each group's proposal and action plan**
11:30	**TEST** **Gallery Walk and Feedback**
11:45	**Debrief and Next Steps**