

Final Report

**Cornell Capstone Team and Global Livingston
Institute**

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Table of Contents

Executive Summary	3
Literature Review	6
Data and Methodology	19
Findings and Analysis	22
Recommendations	28
Works Cited	37
Appendix	40

Executive Summary

In Spring 2017, the Cornell Institute of Public Affairs (CIPA) capstone team—Quynh Tong, Yang Li, Rafia Farooqui, and Jazlin Gomez, worked with and provided pro bono consulting services for the Global Livingston Institute (GLI), a non-governmental organization in Uganda dedicated to cultivating global understanding of poverty and fostering healthier communities. GLI is about to launch training programs on its model farm to introduce local farmers to new crops, techniques, and technology to improve their farming efficiency and overall production.

The CIPA capstone team conducted a needs assessment to help GLI design better training programs to be launched in summer 2018 and collected baseline data to measure future social impacts generated by GLI's programs. The Cornell Capstone Team worked together with GLI to accomplish two key goals: (1) Develop and conduct a survey to assess the training needs of local farmers to help design training programs to be launched in Summer 2018. (2) Gather baseline data from local farmers to measure future social impacts of these training programs.

Data Collection and Methodology

After reviewing the literature, the Cornell Capstone Team developed a survey and conducted it among 30 farmers who were randomly selected and recruited in Lira. From April 3rd-10th, 2018, Quynh Tong, Yang Li, and Rafia Farooqui traveled to Uganda. With the help of The Children of Peace Uganda, the capstone team conducted one-on-one interviews with 30 local farmers in Lira over a period of two days. The respondents ranged in age from 19 to 60 years and had varying years of farming experiences ranging from 1 to 60 years.

The semi-structured survey was a combination open and closed ended questions. By conducting the survey, the capstone team collected baseline data which could be used to measure social impacts. The variables of social impact measurement included annual gross

income, acres of land cultivated, household expenditure, variety of crops, yields of crops, etc. The capstone team also collected information about participants' current farming skills and training needs, which could help to improve the design of the planned training programs.

Major Findings

- Farming was the primary if not the sole source of income for nearly all participants.
- The greatest challenges in farming are pests/diseases, lack of equipment or labor, high costs of seeds and low produce sale, and lack of farming knowledge and technique.
- All farmers use very basic farming techniques (mainly planting and harvesting by hand) and have limited knowledge of agronomic farming.
- Most of them cannot afford farming tools and have no access to advanced farming techniques. Few of them are affiliated to any farming cooperatives.
- They grow a small variety of crops such as soya bean, beans, cassava, maize, sweet potatoes, etc. Almost none of the farmers were aware of harvest storage techniques but directly put harvested crops in their houses. Farmers communicated their desire to receive trainings on seed selection, planting techniques, pest control, harvest storage, and marketing among other things.
- Most farmers prefer practical trainings demonstrated in farms, which could also include in-class instruction.
- Training programs should incorporate an experiential, practical learning approach more than the classroom approach typical in training sessions.
- The best locations to have the trainings are on the farms of participating farmers.
- Facilitators or trainers should have the practical skills and knowledge of agricultural production in the area.
- Most respondents mentioned that it would be easier for them to attend training programs if transportation, meals, accommodation were provided, along with necessary inputs for the trainings such as seeds, equipment, and stationary.

Recommendations

To better design the training programs and measure their social impacts, based on our findings from the survey carried out in Lira, the CIPA capstone team came up with the following recommendations for GLI:

First, we suggest that GLI should partner with an organization working in Lira to identify farming techniques that fit for local communities in the region. Since farming tools are not affordable to most farmers, GLI could contribute to the provision of supplying equipment in the region. Also, GLI should support community integration and impart agriculture knowledge via cooperatives.

In addition, GLI should develop a training plan for the training programs, approach training facilitators with practical farming skills, launch various programs to meet different needs, and arrange necessary logistics for farmers participating in the training program(s). For example, GLI should incorporate practical field learning approach more than the classroom approach in the training sessions. GLI should provide transportation, meals and accommodation together with necessary inputs for the trainings such as seeds, equipment, and stationary.

Finally, GLI should identify indicators in the survey to gauge social impacts, such as annual gross income, acres of land that cultivate, household expenditure, variety of crops, yields of crops, etc. Then, GLI should follow up with participating farmers about the effectiveness of training programs. In the long run, GLI can contribute to poverty reduction in the region through imparting knowledge on technicalities of agriculture, job creation, and income generation, which are the expanded social impacts of these training programs.

Literature Review

Agriculture in Lira

There is agricultural diversity in Uganda with a generally favorable policy environment promoting foreign investments and development assistance. Uganda achieved high rates of growth during the 1990s following implementation of the government's economic recovery program, strengthening various economic indicators and coffee export market. These rates have been maintained since 2000, with high inflows of direct foreign investment and development assistance. Because of the country's impressive growth and strong pro-poor policies, poverty declined from 56 per cent in 1992 to 31 percent in 2005 (Malual, 2014). However, Uganda is still a very poor country with a low per capita gross domestic product (GDP), a predominantly poor rural population with high reliance on growth assistance, landlocked position, and vulnerability to events in neighboring countries.

In Uganda, funding agencies like the U.S. Agency for International Development and the U.S. Department of Agriculture promote commercial activity to support the farmers. They aim to connect local farmers with larger businesses selling components essential to farming. These components are pesticides, tools, and improved seeds, which are disease- and drought-resistant. Facilities like Tillage companies, tractors-for-hire and boosting crop yields are being introduced to farmers in distant villages to improve crop production. Banks and other financial institutions are also encouraged to provide loans to poor farmers with little collateral to start extending credit.

Agriculture remains a key sector in Uganda, but its share of GDP and growth rates has been declining since 2000. In 2007, agriculture accounted for 50 percent of exports and over 70 percent of the labor force, and it remains the main source of livelihood for many parts of the country, such as Lira. Uganda is well gifted for agricultural production, with two rainy seasons annually and fertile soils, but there are local variations in the country (Malual,

2014). Agriculture is vulnerable to climatic hazards, particularly drought and floods, which have increased in frequency in recent years (Malual, 2014). Agriculture is also vulnerable to pest and disease, such as coffee wilt, banana wilt and foot-and-mouth disease leading to food insecurity in the region. Northern Uganda is also host to the fastest-growing refugee crisis in the world which affects the food security situation in the country. (UN News Centre, 2017).

Lira is one of the five northern districts of Uganda and its capital Lira town is 352 km from the national capital Kampala. Uganda has an uneven economic performance in its southern and northern regions. While southern Uganda is progressing at a rapid growth rate, in the rural north, poverty and malnutrition are widespread. Agriculture is the main economic activity in Lira, almost 86% living in rural areas do subsistence farming for their livelihoods (Malual, 2014). Like other parts of Uganda, Lira has two peak rainy seasons, April-May and August-October. Cattle herding had been an important livelihood activity and indicator of wealth before the war, but it has been drastically reduced now due to insurgency (Malual, 2014).

Lira is one of the most heavily deforested districts in Uganda, due to clearing of more land for agriculture, and other uses of firewood (Government, 2009). The main crops grown in large quantity are cotton and sunflower and they are also exported to other countries. Other crops grown in Lira are cotton, legumes, sunflower, simsim, maize, cassava, tomatoes, mangoes, oranges and other fruits. Along with Apac, Uganda, Lira has one of the largest programs in the world of organic export production by smallholders has been established (Government, 2009).

Lira also is comprised of formerly displaced rural households from the war with the Lord's Resistance Army (LRA). Despite the loss of assets and damaged infrastructure, households have re-established themselves by re-building their houses, securing their own food, educating their children, and meeting health care needs after the peace agreement signed in 2006 (Malual, 2014). The post conflict households in Lira are dependent on natural

resources and agriculture. Due to limited availability of resources, people work together and pool resources to sustain their livelihoods. Informal associations or groups with various motives and goals are prevalent in the area with support from NGOs and government agencies (Malual, 2014). Agriculture is the main source of livelihood in the area supplemented by livestock, casual labor, and trade.

Some of the problems facing various parts of the agriculture sector are the shortage of manpower, poor production methods, and the prevalence of diseases and pests. The market is disorganized, the harvest quality too poor, and there are no formal market places to promote the buying and selling of goods. Improvements in agriculture can improve the lives of the citizens and reduce poverty, especially with the adoption of modern techniques and better-quality inputs.

Social Impact

Definition of Social Impact

Social impact is very widely discussed by both the public, private, and nonprofit sectors, but experts in the field have not reached consensus around a definition on this multifaceted topic. Below are just a few among multiple research results found when searching “the definition of social impact” in academic databases and internet search engines.

Michigan Ross Center for Social Impact in University of Michigan defines social change as “a significant, positive change that addresses a pressing social challenge. Having a social impact is the result of a deliberate set of activities with a goal around this definition.”¹

- Social impact is defined as “the net effect of an activity on a community and the well-being of individuals and families” by Centre for Social Impact (CSI), which is a

¹ <http://socialimpact.umich.edu/about/what-is-social-impact>

collaboration of three universities in Australia with a mission to catalyze positive social change.²

- By the definition of A Dictionary of Environment and Conservation (Park, Allaby, 2017, P.842). The changes in social and cultural conditions, which can be positive or negative, which directly or indirectly result from an activity, project, or program.
- Being a part of the Wharton School of the University of Pennsylvania, Knowledge at Wharton High School (KWHS) interprets social impact as “the effect an organization’s actions have on the well-being of the community”.³

The above definitions are disparate, which sheds some light on the complexity of social impact. Impact on its own can be an influence on virtually anything, which make it broad, vague, and inaccessible. However, the different definitions are similar in terms of the nature of social impact. First, they all accentuate the role of activities or actions in addressing social problems. These interventions can be planned or unplanned policies, plans, initiatives, programs, projects, etc. Second, they all give particular importance or attention to impact, which basically some changes of affected groups before and after particular interventions. The impacts can be positive or negative, intended or unintended social consequences.

To make it manageable and relevant to our capstone project, the Cornell project team defines social impact in this report as “positive social changes on a target group invoked by a deliberate set of interventions”. Donors to nonprofit organizations and investors to for-profit social enterprises have shown an increased interest for greater accountability for their money intended to address social challenges. As a nonprofit organization dedicated to reducing poverty and improving communities, Global Livingston Institute (GLI) itself also expects to collect evidence to prove the effectiveness of their activities through which they expect to make tangible changes to people’s lives, communities or society as a whole.

² <http://www.csi.edu.au/about-social>

³ <http://kwhs.wharton.upenn.edu/term/social-impact>

Even if narrowed into a clear definition, impacts are still difficult to measure. It has always been challenging to find appropriate indicators to gauge social impact from different program and projects. Part of the reason may be that the task of measurement is complex itself. Therefore, the project team should first examine the framework and approaches to measure social impacts.

Major Framework and Approach to Measure Social Impact

Impact evaluation or impact assessment usually refers to measurement of outcomes, which are the intermediate impacts of a program. It is often used for reporting or providing proof of effectiveness to external stakeholders (Epstein, M., & Yuthas, K., 2014, P.125).

Measurement is a direct way for organizations to know whether expected social impacts are achieved or to adjust their activities to create the impacts they desire.

The client, GLI, has proposed a training initiative to address the needs of farmers in Lira, Uganda. Their purpose in the program is to have a positive social impact, and to assess the effectiveness of any implemented program, they need measurements to assess social impact. Evaluation training is a framework within impact measurement which can be applied to this project as a tool to better understand social impact measurement.

Don Kirkpatrick's Training Evaluation Framework is considered to be the most popular and primary approach to evaluate training programs (Bates, 2004). This model includes four levels of evaluation—reaction (how participants react to the training), learning (what participants have learned), behavior (how much participants' behaviors have changed), and results (which expected outcomes occur as a result of the training). His theory shed light on how to measure results of training programs at all levels, from participant satisfaction through to social impact.

Researchers use different approaches or tools to measure impacts. Some prefer cost-benefit analysis as their major tool of measurement, while others advocate the use of logic

models (Singh, K., Peshin, R., & Saini, S. K., 2010, P.66). Given the nature of the proposed GII training program, it is hard to calculate in advance whether its benefits will outweigh the costs. As such, the project team reviewed literature focusing on how to use logic models to measure social impacts.

The United Nations (2011) measures social impacts of programs with Result-Based Management (RBM) which is a management strategy widely adopted by international organizations. In this approach, the first step is to determine what should be measured by clarifying the objectives of the program or what is really expected from the program. Once objectives are clarified, the next step is to focus on outcomes—whether the planned activities can be expected to create the desired impacts. The logic model of the program should be identified, which the logical relationships between the inputs (resources), activities, outputs (results), outcomes (intermediate effects), and impacts (long-term effects) of a program (UN RBM Handbook, 2011, P. 13). After determining the outcomes of a program or project, the next stage is to select clear-stated indicators, which tell evaluators what will have to be observed to prove that the outcomes are achieved.

Epstein, M., & Yuthas, K. (2014) reviewed various measurement approaches and provided practical guidance for nonprofits, companies, and impact investors on how to measure social impacts. They developed a five-step Social Impact Creation Cycle to describe the most necessary steps for creating, measuring, and improving impacts. These five questions include what will you invest? What problem will you address? They indicated that an organization should figure out their purposes of measurement, impact objectives, approaches, and metrics before measuring the social impacts created. This approach is actually using logic models in the process of measuring social impacts.

Indicators to Measure Social Impact of Agricultural Training Programs

Impact indicators measure the long-term effect of an intervention and it usually takes years to achieve and to measure. They vary among programs and even from different

perspectives. By reviewing literature on agricultural training programs and evaluations, we can refer to indicators or metrics that are commonly used in agricultural training programs with the purpose of improving participants' farming practices and increasing crops yields. Good indicators should be measurable, cost-effective, and relate to a specific outcome.

NORC at the University of Chicago (2012) undertook an impact evaluation of the Farmer Training and Development Assistance (FTDA) project, which gauged the impact of the project on participants' household income and employment, as well as its impacts on the cultivation of some cash crops. Net household income and total household consumption were selected to measure increased household income. Labor expenses was used to measure employment status on farms. It used net income from and input expenditures on horticultural crops/basic grains as indicators to measure changes in crop mix. Household income were broken down into three categories: income from basic grains, income from other crops, and income from employment in the labor market. Income from crops was calculated as the total value of crops, including the amount sold and used for own consumption.

Singh, K., et al. (2010) conducted an impact evaluation of agricultural vocational training programs in Indian Punjab. The indicators used in their surveys included reaction of trainees, gain in knowledge, adoption status, and economic benefits of the training programs. The reaction of trainees was measured by the extent that trainees were satisfied regarding the trainers, subject matter, physical facilities and teaching materials. Gain in knowledge refers the gap between the participants' test scores before and after taking the training courses. Adoption status was measured by the percentage of trainees setting up their own enterprises. Economic impact was measured in terms of respondents' additional income generated by adopting mushroom or bee-keeping units. It was measured in local currency per unit per year and its proportion to the total household income.

Mwamakimbula, A. M. (2014) assessed the factors impacting agricultural extension training programs in Tanzania. Interview questions were divided into five groups: awareness of local extension services; perceptions of extension training and content;

motivations and challenges to participate in extension training; preferences for delivery; and demographic information.

To measure the impact of an organic farming project in terms of alleviating poverty for farmers, the Research Institute of Organic Agriculture conducted a 10-year study in the East Africa since 2007. They carried out a survey among local farmers before and after their adaptation of organic farming methods. The survey measured farmers' input cost, crop yields, and profit margins of both conventional and organic systems⁴. It was found that organic farming produced the similar yields but was able to generate a higher profit with lower input and higher market price. They therefore confirmed that the organization's approach had a positive impact on local farmers.

Agricultural trainings in Africa

This section reviews the agricultural training programs that have been conducted in Africa in general and Northern Africa in particular, with a view to gain insights into the capacity needs of the farmers, the types of trainings they need, and effective ways to conduct those trainings.

Capacity gaps to boost agricultural effectiveness and efficiency

Poor agricultural practices are the main reason why farmers in Northern Africa have not been able to make a better living out of agriculture (AGRA, 2014; Nakakawa & Magambo, 2015). Generally, farmers do not attend formal education or trainings on agricultural skills but mostly learn them from their parents and communities who also have little knowledge of effective agricultural practices (Lowe & Phiona, 2017). As a result, farmers lack of adequate technical knowledge and practices. 93% of them depend on family labor for agricultural work instead of using technologies, and 53% of them till their land by hoes

⁴ <https://www.standardmedia.co.ke/business/article/2000209257/survey-organic-farming-beats-conventional-agriculture-in-africa>

(Dalipagic & Elepu, 2014). They hardly have the capacity to test their soils (Nakakawa & Magambo, 2015) as well as knowledge of soil fertility management (FAO, 2006). They often fail to plough in time for plants to achieve full harvest - (Nakakawa & Magambo, 2015) and have low use of farm chemicals like pesticides and fertilizers (Lowe & Phiona, 2017). Also, they have insufficient knowledge and skills on how to bulk and stores their produce, which results in post-harvest losses and low market prices for their produce (Lowe & Phiona, 2017). To sum up, farmers in Northern Africa suffer from low crop yields and small earnings due to a lack of necessary agricultural knowledge and skills.

Agricultural trainings needed to fill the gaps

“Agricultural education, extension, and advisory services are a critical means of addressing rural poverty, because such institutions have a mandate to transfer technology, support learning, assist farmers in problem solving, and enable farmers to become more actively embedded in the agricultural knowledge and information system” (Davis, et al., 2010). To reduce poverty in an agriculture-based economy like Uganda where 70 percent of the population works on farming (USAID, 2008), agricultural trainings are critical.

Farmers need trainings on integrated soil fertility management to restore the fertility of the soil and to increase yields. In other words, they need to understand the importance of rotating crops with nitrogen-fixing legumes, reducing or eliminating ploughing, and applying organic and inorganic fertilizers. At least, they need to know how to test their soils so that they can tailor their practices on the soils accordingly (AGRA, 2014). Since a majority of them still use hoes to till land, they need to learn more effective land tilling techniques (Lowe & Phiona, 2017).

Farmers need to know what type of crops they should plant to yield good profits (Nakakawa & Magambo, 2015). That means understanding the variety of new and

improved seeds, the characteristics each type of seed, and whether the seeds are suitable given the conditions they are facing, e.g. soil condition, availability of labor, etc.

Since farmers are generally not familiar with the use of farm chemicals like pesticides and fertilizers, they need trainings on their benefits and usage to control pest and diseases. They should learn to independently choose the chemicals that work for their farming, instead of using those that their fellow farmers use (Lowe & Phiona, 2017).

Harvesting and post-harvest handling are also techniques that farmers need. They should be equipped with preliminary processing skills like cleaning, sorting, and storage so that they can store their produce longer and sell them at higher price in the market (USAID, 2008).

Other necessary trainings involve proper seed rating, timely planting, line planting, proper spacing, timely weeding, and the use of herbicides. There should also be trainings on the adoption of different agricultural technologies to make farming more efficient.

Methods to carry out effective agricultural trainings

Demonstration training is favored by the organizations conducting agricultural trainings in Africa. Demonstration training is a kind of demonstration-based learning which is generally understood as “the observation by the learner of another person (or team) performing the tasks, components of tasks (either in real time or through some form of recorded or computer-generated medium), or characteristics of the task environment that have been targeted for training” (Salas, et al., 2009). In the humanitarian agriculture related interventions in Pader from 2005 to 2010, 9 out of 13 organizations that provided agricultural trainings used this method (Wairimu, Hilhorst, & Christoplos, 2016). In Northern Africa, the three most noteworthy programs, i.e. the Farmer Field School (FFS) by the Food and Agricultural Organization (FAO), the trainings by the Sasakawa Africa

Association, and the Agricultural Productivity Enhancement Program (APEP) by the United States Agency for International Development (USAID), used this method in their trainings.

Specifically, in a typical FFS, “a group of 20-25 farmers meets once a week in a local field setting and under the guidance of a trained facilitator. In groups of five they observe and compare two plots over the course of an entire cropping season. One plot follows local conventional methods while the other is used to experiment with what could be considered “best practices”. They experiment with and observe key elements of the agro-ecosystem by measuring plant development, taking samples of insects, weeds and diseased plants, and constructing simple cage experiments or comparing characteristics of different soils. At the end of the weekly meeting they present their findings in a plenary session, followed by discussion and planning for the coming weeks” (Davis, et al., 2010). APEP advanced and consolidated this model by tying smallholders directly to buyers, often through producer organizations. “The model allowed for lead farmers to manage demonstration plots in thousands of Ugandan communities that produced yields ranging from 100 to 150 percent higher than the baseline for low-input annual crops, and 130 to 500 percent higher than the baseline for tree crops” (USAID, 2008).

This method works because it let the farmers see the benefits of the practices with their own eyes. “Getting poor, risk-averse farmers to adopt a simple new technology is not easy. Persuading them to adopt one as multifaceted as integrated soil fertility management is much harder. Farmers are right to be skeptical of a new idea. They must first be able to see its benefits, preferably on a nearby farm similar to their own.” The method also enables the farmers to learn “indirectly through skills, information and knowledge transfer” (Nakakawa & Magambo, 2015).

Cultural Awareness

One important aspect of this project is cultural competency and awareness. This section aims to identify cultural practices and norms in Lira, as well as a brief sociopolitical context for the region. It also will include sections on best practices for engaged learning and for qualitative research with vulnerable populations.

Historical Background

From 1986- 2006, the Lord's Resistance Army, known for its brutality, systemic rape, and forced recruitment of child soldiers, devastated northern Uganda. In 1996, government-run camps for internally displaced persons (IDPs) were established throughout the region and were meant to be safe havens from conflict. These sites were characterized, however, by poverty, violence, and systemic rape and forced marriages. Peace talks in 2006 officially ended the conflict in Northern Uganda, but the LRA continues its brutal influence in the Democratic Republic of the Congo, the Central African Republic, and South Sudan. Lira is home to refugees from northern Uganda as well as from the DRC (Invisible Children).

Currently, Lira is the fourth-largest city in Uganda, with a population of around 100,000 people. It is a home to refugees as well as former child soldiers and, according to the 2014 Census, has a very vulnerable population.

“One in every eight (12.5%) of children aged 6 – 12 Years were not in school; Two out of every 25 (8%) children less than 18 years of age were orphaned; One in every 16 (6%) of the girls aged 12 to 17 years had already given birth; One in every 15 (6.5%) of the girls aged 12 – 17 had ever been in a marriage union; Seven out of every 10 Children (70%) aged less than five years did not have a Birth certificate.” (UBOS)

Working with Former Child Soldiers

As Lira has been severely impacted by the war, and as many of the farmers and participants in this research are former child soldiers, it is important for the Cornell project team to understand the specific challenges faced by and needs of former child soldiers. As stated in the article “Challenges Faced by Former Child Soldiers in the Aftermath of War in Uganda”,

“war not only affects individuals, but also destabilizes the very social fabric of affected societies” (Vindevogel, 2013). Though this project is primarily focused on agricultural training, it cannot be divorced from the context of this social fabric. Better understanding of this social landscape and particular divisions based on identity will also be important to this research.

Vindevogel et. al used a mixed methods approach to catalogue and categorize challenges faced by former child soldiers in Northern Uganda. 237 challenges were reported (166 by former child soldiers) and these challenges were grouped together into categories of (1) emotional challenges, (2) training and skills-related challenges, (3) economic challenges, (4) cultural and societal challenges, (5) war-related living challenges, (6) relational and social challenges, (7) caretaking and familial challenges, (8) educational challenges, (9) justice, protection, and freedom-related challenges, (10) social services and facilities-related challenges, (11) behavioral challenges, (12) political challenges, (13) health and development related challenges, (14) spiritual challenges, (15) other challenges (Vindevogel, 2013).

The study states that these extensive challenges are faced by the entire community, not only by former child soldiers, although former child soldiers are more likely to express emotional challenges. Gender is another factor which influenced the degree of challenge, especially as it related socially. After the Cornell project met with the founding director of Children of Peace, Jane Ekayu, the team learned that girls and women could be ostracized from communities for having been former child soldiers and faced a particular set of challenges with reintegration. In creating an agricultural training program, which specifically addresses challenges 2 and 3, an opportunity exists to also address other challenges.

For example, health and development related challenges are heavily linked with nutrition and food safety. Increasing knowledge about agricultural harvesting and storage techniques can not only improve nutrition but can decrease the disease. When speaking of food safety and storage, basic hygiene information can also be distilled, which would

further address that challenge. Perhaps the most obvious opportunity to address the specific emotional, psychological, and social challenges faced by the post-war area is to build community. The agricultural trainings have the opportunity not only to address the economic and physical needs of farmers, but to impact the social network and degree of community support. The curriculum which results from this project should account for these multiple, intersecting challenges and approach them with a systems-thinking analysis rather than focusing in to address isolated challenges.

Data and Methodology

Development of Research Questions

The Cornell team developed research questions based on existing knowledge about the objective of the project: to assess the training needs of local farmers in Lira and measure future social impacts of the training programs to be offered by GLI. The team first brainstormed questions that needed to be answered in the field research as well as questions that are crucial to the effectiveness of agricultural training programs. Then, the team categorized the questions into four groups: 1) cultural awareness, 2) agriculture in Lira, 3) agricultural trainings in Africa, and 4) social impact measurement.

These research questions guided the project by helping the team better understand the macro-factors that influence the project, such as the local culture in Uganda and the status quo of Lira's agriculture sector. The questions also reminded the project team of key issues to be addressed in the research. These included identifying needed farmer skills, assessing trainings of farming skills in other similar programs in Africa, and evaluating social impact measurement of these training programs. The team gained a comprehensive overview of the project by answering the research questions.

Literature Review

In the literature review, the consulting team compiled existing data surrounding four main topic areas: cultural awareness and a sociocultural overview of Lira, agriculture in Lira, frameworks to measure social impacts, and existing agricultural trainings. In each area, different methodologies were favored.

In the section on cultural awareness, demographic data from the Ugandan national census was used alongside historic information on the region to better understand the immediate history and sociocultural and economic climate of the area. For a better understanding of the agricultural climate in Lira and its relation to the socioeconomic needs of the population, information was gathered from a variety of NGOs, government agencies, and from a University of Iowa study about agriculture in Lira. In each of these sections, data was collected to have a baseline understanding of the area.

The section on measuring social impact took a more comparative approach and gathered information from various sources to better define social impact and thereafter compare approaches. Information was gathered on the types of social impact measurements used in various academic and nonprofit studies, within the related field of agricultural development. The concluding section on existing agricultural trainings compiled survey data and existing needs assessments to identify the main challenges to both farming in Lira, and training farmers in Lira. The mostly qualitative feedback gathered from academic, governmental, and NGO sources allowed the consulting team to identify imminent needs in terms of agricultural trainings, as well as practices to avoid.

Field Survey

Based on client discussions, the project team conducted a qualitative survey in Lira to identify the training needs of the farmers and community members. The qualitative survey

was semi-structured to gain in-depth information about farmers and their preferences for trainings. The end goals were to develop an understanding of problems faced by farmers, and to understand how a training program developed by GLI could best respond to those issues.

The Cornell project team developed the survey by considering Lira's cultural norms. The team also consulted the previous capstone team members and the documents provided by GLI to build on the work that has already been done on these fronts. In addition, the team conducted a literature review on the region and examined various aspects of the community. The survey was divided into parts that explored different areas of information related to the participants, including sections on farming, marketing and sales of crops, training needs assessment, and background information. Most of the questions in the survey were open-ended which allowed respondents the freedom to express themselves without restrictions and enabled the project team access to richer insights about different opportunities and issues faced by farmers in Uganda. This survey data allowed the team to understand detailed information about the basic farming practices used by the farmers interviewed in Lira and how GLI could meet farmer needs through training sessions.

The Cornell team conducted interviews using the survey as a guide in a one-on-one setting. Even though previous qualitative research in the form of focus groups provided the team with in-depth information about farmer needs in Lira, the team conducted the survey among a small number of community members and farmers (27). The team worked in association with translators while conducting the surveys and received feedback from members of the GLI team on the survey language to identify specific words which should, or should not, be used to be more relatable and relevant to the respondents. The team also performed observational research by observing community members and farmers in their actual element. The survey results were coded for data analysis.

Data Analysis

Along with the narrative survey, the project team created a collection of “field notes”, which recorded impressions of the environment, people’s behaviors, and nonverbal clues that can help to better understand farmers’ needs (Sutton & Austin, 2015).

During the survey, team members identified initial themes and patterns which were then actively discussed during debriefing sessions. This allowed the team to better identify and analyze emerging patterns as the survey conduction continued.

After carrying out the survey, the project team coded the answers from the survey. To avoid biases in coding the information, the participants were given a coded identification letter and number and the project team member who was not present in Lira developed a system of coding based purely on the responses given. The field notes served as additional sources of information to provide richer context for the data.

After coding the responses, the team processed the data. This process helped to draw out common themes and patterns which provided initial insights into the farmers’ needs. The findings were supported by the statistics, field observations, as well as direct quotation from the interviewees. The team then verified the findings with the original data collected, documents, and GLI.

Findings and Analysis

Participant Demographics and Education

The 30 participants joining the survey were recruited by Children of Peace Uganda (CPU) from their network of farmers. All the interviews were conducted on the premises of CPU by the members of the Cornell project team, with the support of interpreters from CPU.

The participants' age ranged from 17 to 60 with a median age of 25 and 50% of farmers between ages 20 and 52. Of the interviewed farmers, 25.9% have other jobs, including being pastor, cook, electrician, construction worker, and social worker. 51.9% were married, 33.3% were single, while the rest (14.8%) were widowed or separated. The majority 85.2% of participants received at least some education while 14.8% had received hardly any or no education. Of those participants who had received an education, 91.3% had completed at least a primary 5 level or above, 43.5% had completed primary and had some senior or secondary education, and 8.7% had some vocational training.

On average, the families had 7.2 people, ranging from 5 to 13 members. Children made up 52.8% of reported families. It should be noted that this could be an underreporting of children as the number of children recorded per household was less than the number of children in school in the household in some cases. Depending on translation, the question may have been interpreted either as how many children belonged to the interviewee or how many children were in the home of the interviewee. 77.8% of families reported having children, and of those families with children, the number of children ranged from 1 to 9 and the average number of children was 4.9. 72.8%* of the reported children are sent to school with 30% of the families send all their children to school. While the reasons for not sending children to school varied, sometimes the children were too young or old, or the school fees were too expensive. This explains why 48.1% of respondents said school fees were one of their family's biggest challenges (this number was 52.4% for families reporting children and 74.1% said education was the greatest or one of the greatest costs in their household expenditure.

Participant Income

The gross income per year of the respondents ranged from 75,000 UGX to 10 million UGX with a median gross income of 500,000 UGX per year. This is compared to the per capita gross domestic product of 2,463,076.84 UGX, or \$ 662.10 USD (Trading Economics). The standard deviation of gross household income is 1,918,787, which is influenced by the

outlier of one respondent's income of 10 million UGX on her "good year". If the respondent's "bad year" income of 700,000UGX was instead calculated, the standard deviation would change to 282,309.2 UGX. 14 out of 27 of respondents' gross annual income fell between 325,000UGX and 750,000UGX. This represents the interquartile range and eliminates both the top quartile and bottom quartile, for a range rather than point estimation of central tendency.

Of those who reported their incomes (25/27), income from farming made up 33.3% to 100% of their overall income. Farming accounted for a median of 90.9% of gross income, and for all but two respondents, farming accounted for at least half of the gross annual income. Apart from farming, 48% (12/25) of those who reported their income had no other source of income while 52% (13/25) had other income from their second job. Of those who had multiple sources of income (13), farming accounted for a median of 60% of gross income.

Farming: Challenges

Since for nearly all participants farming is the primary if not the sole source of income, it is a vital aspect of their lives. Participants cited that the greatest challenges they faced related to farming as: pests/disease (55.6% or 15 of 27 participants listed this as among their greatest farming challenges) lack of equipment or labor (51.9% 14 of 27) costs (of seeds or low produce sales) (29.6% or 8 of 27), lack of farming knowledge and technique (18.5% 5 of 27) , and 22.2% or 4 of 27 reported other difficulties, which included transportation costs, unpredictable weather, personal ability to farm, and the quality of the land. These challenges prevented the people from farming productively, which in turn impacted their income, and subsequently kept them in cycles of poverty and food insecurity.

The main water source is rain, with little or no sources of water irrigation. The weather is also uncertain as the participants complained that sometimes their plants are burned by

the excess sun. The participants were gathered by CPU (Children of Peace, Uganda). CPU confirmed that no specific sampling method were used to involve these participants, but during interviews we felt that they are spread all over the place in Lira, facing different water conditions.

Farming: Crops and Techniques

Participants tend to grow similar crops, such as soya bean (55.6% or 15 of 27), maize (55.6% or 15 of 27), cassava (25.9% or 7 of 27), pigeon peas/peas (29.6% or 8 of 27), beans (29.6% or 8 of 27), simsim (14.8% or 4 of 27), and sunflower (14.8% or 4 of 27). Participants chose to farm these crops for various reasons, including: that they fit the local soil, their markets are already available, so the farmers can easily earn money, the seeds for planting are available, and the knowledge on how to plant those crops is available, while knowledge about other crops was less accessible.

The farmers tend to use very basic farming technique and have limited understanding of agronomic farming. 48.1% (13 of 27) of the participants tilled by hand and hand hoes only and 18.5% (5 of 27) of participants used mostly hand and hand hoes, hiring ploughs and oxen only when they could afford it. 81.5% (23 of 27) did not report using any nursery practice, 29.6% (8 of 27) used seed soaking. All respondents reported weeding by hand (as opposed to using herbicides or weeders). 63.0% (17 of 27) planted by only direct seeding which they described as “dig a hole, put seeds, put soil over, then repeat.” 100% of respondents depended on the rain for watering, one of the participants said: “If there was no rain, I just left the crops die.” Only 18.5% (5 of 27) of participants reported watering of any kind, and this was by watering can and for a specific crop on a small plot of land or for a nursery. 37.0% (10 of 27) did not use any farming chemicals while 6.03 % (17 of 27) used either pesticides, fertilizers, or herbicides. Of those who did use farming chemicals, they often claimed to choose the brands of the chemicals based on their neighbors’ advice. All participants harvested the crops by hand. 59.3 % (16 of 27) do not know any technology that can be used in farming.

Crop Storage

The farmers tend to store their crops simply by putting them in the granary or directly in their house (at least 81.5% or 23 of 27), which explained why the crops went bad after a while and they could not be used to preserve the seeds for the following season. While all but one participant (96.3% or 26 of 27) sold their crops, inefficiencies in storage was a detriment to selling. Farmers could not store the produce for long, which meant they had to sell it fast, which results in the over-supply of the produce after the harvest season. The farmers tend to put the crops in sacks without any formal package for selling. These factors are likely to contribute to the low price of the produce. “The price of the seeds for planting is high, but the price for the produce is low.” More than one-fifth (22.2% or 6 of 27) of participants reported seed price as being one of their greatest challenges to farming, which could be alleviated by properly storing fruit to obtain usable seeds.

Agricultural Training

37.0% (10 of 27) of the participants have not heard of any farming trainings in the past 3 years. While 63.0% (17 of 27) knew about some, only 52.9% (9 of 17) of those that knew about the trainings attended while the rest (47.1%, or 8 of 17 that knew about the trainings) were not invited to participate or found out about the trainings too late. All the farmers wanted to receive farming training of some kind, and all listed specific topics they wanted to know more about. In regard to farming techniques, the farmers want to have trainings on planting techniques(mentioned by 46.15%, or 12 of 26 respondents), pest control and weeding(38.46%, 10 of 26), storage and preservation of seeds and crops(30.8%, 8 of 26), how to increase yield (23.08%, 6 of 26), and how to grow a specific crop(23.08%, 6 of 26)When asked about soft skills farmers wanted to learn at trainings, 42.31% (11 of 26) of farmers mentioned marketing or branding, and 26.9% (7 of 26) of

respondents said learning how to sell or do business as a farmer was important. They also want to learn how to keep animals from crops, how to raise animals, and how to grow fruit trees.

When asked about the training methods, 26.9% (7 of 26) specifically said the teachers should combine teaching theory in class and practical training in the garden. 30.8% (8 of 26) of respondents specifically mentioned group or community trainings, and 26.9% (7 of 26) of participants specifically said they wanted trainings to take place in their own village, ideally their own gardens. The focus on community was apparent. One participant mentioned that the training should be conducted in a group of up to 30 people who are from the same area of living, so they could support each other afterwards. Some brought up transportation to another site as a detriment. 53.8% (14 of 26) of participants wanted at least some form of demonstration or classroom learning and 57.7% (15 of 26) wanted at least some form of practical or applied training. Some participants specifically said that teachers should both speak and write on the boards so that the farmers can easily follow. The instructor should also bring any necessary equipment to the class for demonstration and let the farmers practice using the materials. The farmers tend to like a trainer who is knowledgeable and experienced. They also want someone who “do not intimidate people”, they should “respect the farmers and they’ll respect back.” The trainers should be loving, happy, and care about the participants.

Training Accessibility

When asked if there was anything that could be done to make trainings accessible, 63.0% (17 of 27) of participants said it would be easier for them to attend training programs if transportation was provided, with a couple specifically saying that it would be best if the training was done in the village. When asked specifically where the training should take place, 85.2% (23 of 27) of participants claimed they wanted the training in or close to their communities, and only one person said they preferred the training to be outside of their community “to avoid disturbance”) 59.3% (16 of 27) said that meals, and accommodation (if needed) should be provided, with two of these saying that monetary compensation

would also be helpful so that they could bring food back for family members so that they would not feel bad. 22.2% (6 of 27) said that they need training materials such as books and pens, seeds, translators, equipment, etc. 63.0% (17 of 27) of the farmers want to attend training programs on weekdays, with some saying specifically that “weekends are for resting”. However, 25.9% (7 of 27) of participants listed only weekend times for trainings. 6 participants said it is possible for them to attend training programs conducted in March, April, August, or at the end of the year.

Recommendations

Overview

The survey conducted in Lira gave the consulting team an understanding of local farmers’ needs as they related to agricultural training. Based on the survey findings and analysis, the following training plan is suggested for GLI. The primary considerations of the training program are (1) to identify and collaborate with local and foreign experts on farming techniques; (2) to develop a training curriculum and implementation plan; and (3) to arrange the necessary resources for the training and to identify and match farmers with relevant trainings. The curriculum developer(s) will have to design interactive and experiential learning-based workshops, which the trainer will facilitate on the development and implementation of the plan. It is important that the training plan is engaging as the participants of the survey requested for a practical approach to learning than the theoretical approach. The trainings activities need to be designed in such a way that they can be adapted easily to the local context and can be divided in various phases according to the experience level of the participants (such as basic/moderate/advanced level).

Objectives:

A successfully implemented training plan will achieve the following objectives:

- To promote greater income generation for the farmers
 - Higher profit generation from the farmer products
 - More inclusive supply chain
 - Higher profit margins for the producer rather than the middleman
- To support the participation of community and other stakeholders in agricultural supply chains including:
 - Family members who support work on the farm
 - Informal cooperatives
- To improve the supply of agricultural products by farmers meeting market quality standards.
- To promote the provision of farming resources
 - Supplying equipment and inputs for better agricultural practices (This may be done by partnership with local farming institutes, NGOs, public and private sector in the region.)
 - Attracting NGOs, public and private sector stakeholders in the region for subsidized input supplies to the farmers and knowledge sharing.
- To contribute to food security and poverty reduction in the region through imparting knowledge on technicalities of agriculture, job creation and income generation.

The Learning Approach

As suggested by the interviewees, the training sessions should incorporate both theoretical and applied learning methods and should not be limited to a lecture-style classroom approach. Theoretical approach involves studying theory of growing crops, while applied learning involves experimenting with the theory with instruments. As most the participants do not have English written or spoken fluency, the trainer needs to communicate in the local language or with the usage of a translator. Emphasis should be placed on experiential learning methods and should be learner-centered. The learning activities can be a combination of theoretical descriptions of knowledge and simulations for active involvement and should encourage trainees and trainers to utilize their past experiences. Trainings should also take place physically on the gardens and farms of the participants.

The Trainer a.k.a. the Facilitator

The facilitator of the training should be an experienced local or foreign trainer with the following skills and subject matter knowledge:

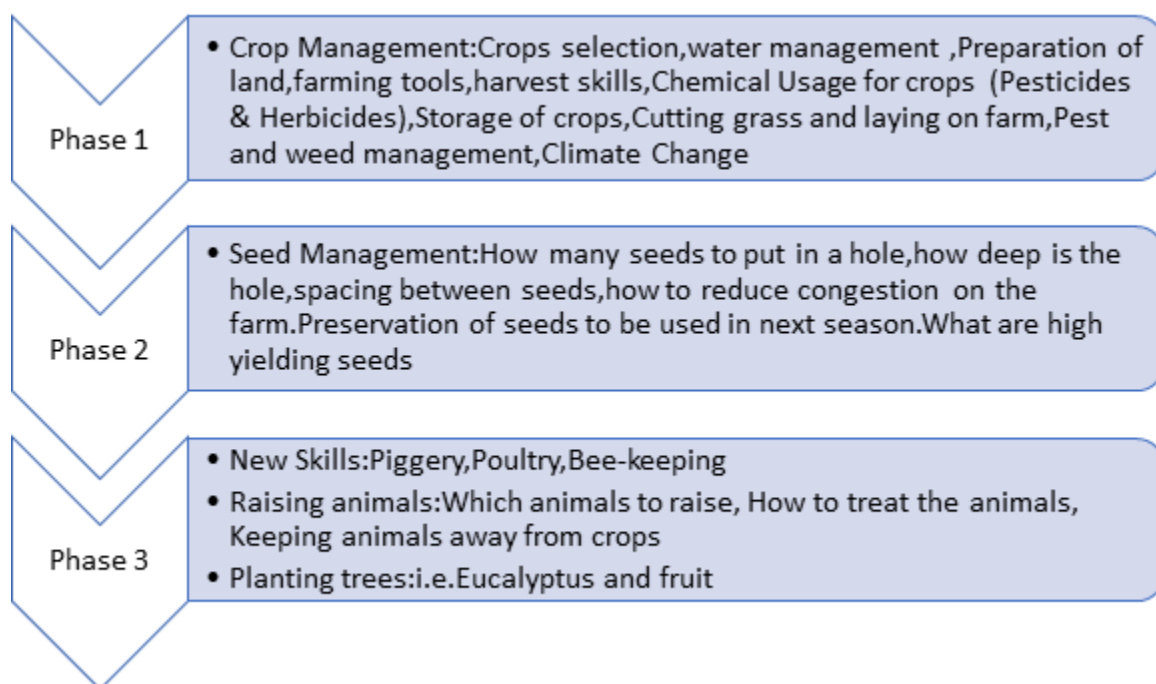
- Ability to build trust within the community of participants;
- Excellent command of farming methods for better yield and productivity;
- Facilitation skills and understanding of adult learning pedagogy;
- Respect for diversity of the participants;
- Open to feedback and considers it a valuable learning opportunity;
- Flexibility to adjust the training according to needs of the participants;
- Ability to apply principles of adult education, experiential learning.

A 'mobile training model' can also be implemented in the area, where the group of trainers do a tour through several villages and conduct training as required.

Topics for Trainings:

There are several technical and soft skills trainings that can be conducted for the participants' basic needs.

Technical Skills:



Soft Skills:

Training Needs Table:

<i>Technical Skills</i>	<i>Soft Skills</i>
<p>1. Crop Management: Crops selection, water management, preparation of land, seeds selection, planting seeds, keeping crops healthy, getting higher yields, timing of planting, better use of farming tool, harvest skills, chemical usage for crops (pesticides & herbicides), storage of crops, cutting grass and laying on farm, pest and weed management. Interest in learning crop management of the following: Onion, vegetables, cabbage, tomatoes, beans, maize, soya bean.</p> <p>2. Seed Management: How many seeds to put in a hole, how deep is the hole, spacing between seeds, how to reduce congestion on the farm, preservation of seeds to be used in next season, what are high yielding seeds.</p> <p>3. Interest in learning about the following: piggery, poultry, bee-keeping</p> <p>4. Raising animals: Which animals to raise, how to treat the animals, keeping animals away from crops.</p> <p>5. Planting trees, i.e. eucalyptus and fruit</p> <p>6. Knowledge about climate change</p>	<p>1. Marketing</p> <p>2. Negotiating</p> <p>3. Branding</p> <p>4. Selling for high profit margins</p> <p>5. Pricing</p> <p>6. Market knowledge</p> <p>7. Business acumen for selling crops</p> <p>8. Record management: How to write important things about farming, keeping records, what is important, what to do</p> <p>9. How to read, write, speak English, and translate</p> <p>10. Gauging quality of crops as per the industry requirement</p> <p>11. Market research</p> <p>12. How to manage finances</p> <p>13. Packaging</p>

List of Materials Required:

The participants need to be provided with the necessary resources for the trainings, such as seeds, ploughing equipment, and stationary.

Marketing:

Most of the participants were unaware of the trainings taking place in the area, so various mediums need to be used to publicize about the intended trainings. Radio seems to be the best form of communication with the locals, but brochures and word of mouth can also serve the purpose.

Location for the Trainings:

As the preference of majority of the farmers is to have practical trainings in their own garden and with community members, the best locations to have the trainings will be on the gardens of intended participants.

Accessibility of Trainings:

To facilitate the participants' ability to attend the training sessions, transportation can be provided if the training is a distant location from the participant's farm/garden. In addition, meals and accommodation for long training sessions are also desirable services for the participants.

Days and Timings:

The consulting team received varied responses about the availability of participants with regards to days and timing of the training. The same training can be conducted several times in a week, weekday and weekend to accommodate the farmer participants.

Social Impact:

As a nonprofit organization, GLI expects to collect evidence to prove the effectiveness of their activities through which they expect to make tangible changes to people's lives, communities or the society as a whole. Therefore, we have three recommendations for GLI about social impact measurement.

First, GLI should identify indicators in the survey to gauge social impact. Measurement is a direct way for organizations to know whether expected social impacts are achieved or to adjust their activities to create the impacts they want. When we designed the survey, we have included some indicators or variables in the survey, such as annual gross income, household expenditure, acres of land cultivating, variety of crops, yields of crops, etc. As it takes time for farmers to apply these farming skills that they learned from the training programs and finally illustrated in their production and income. GLI needs to identify these variables and conduct the survey again in one or two years among farmers who have participated in GLI's training programs. GLI can have pre and post surveys to measure these changes in the participants. This will enable them to understand the effectiveness of their training programs on income generation and poverty reduction.

Second, GLI should measure the effectiveness of trainings including feedback from participants and data comparison. According to Don Kirkpatrick's Training Evaluation Framework which is the primary approach to evaluate training programs, there are four levels of evaluation—reaction (how participants react to the training), learning (what participants have learned), behavior (how much participants' behaviors have changed), and results (which expected outcomes occur because of the training). Our survey can provide information about behaviors and results. Therefore, GLI may want to collect feedback about participant reactions and learning right after the training programs.

Our third recommendation for GLI is to expand its social impacts on improving farmers' skills and lives. This is a long-term goal that cannot be achieve in the short run. There are

many ways to expand or scale social impact such as through encouraging the replication of GLI's training model in other locations. By replicating its method of listening and thinking before acting, GLI can not only replicate a training model from one community to another but also can work with members of communities to design training models that work for them, based on their needs.

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Appendix

BASELINE SURVEY

Respondent No. _____

SECTION 1: FARMING

1. General information

- 1.1. Do you farm/grow food and/or raise animals?
- 1.2. How long have you been farming?
- 1.3. How many acres of land do you cultivate?
- 1.4. Who owns the land that you're farming on?
- 1.5. Are you associated with any agricultural cooperative?
- 1.6. What has been your biggest challenge in farming so far?

2. Farming understanding and techniques

- 2.1. What crops do you farm?

Roots			
Carrots	•	Sweet potatoes	• Irish Potatoes
Beet root	•	Cassava	• Other
List other Roots:			
Cereals			
Beans	•	Sorghum	• Cow peas
Maize	•	Other	
List other Cereals:			
Leafy/Vegetable			
Sukuma wiki	•	Tomatoes	• Black nightshade
Pumpkin	•	Onion	• Pigeon peas
Bell pepper	•	Cabbage	• Eggplant
Amaranth	•	Spinach	• Butternut
Jute mallow	•	Other	
List other Leafy/Vegetables:			

Fruits			
Banana	•	Mango	• Papaya
Tree tomato	•	Avocado	• Passion Fruit
Apples	•	Pineapple	• Other
List other Fruits:			
List any other crops farmed outside these categories:			

2.2. Why do you choose to grow these crops and not others?

2.3. How do you till your land? (Follow up: by hand, hoe, ox? What tools do you use)?

2.4. Do you use any of these practices? If yes, what do you use? (Soak seeds/Raised bed nursery/Flooded/Flatbed nursery)

2.5. How do you weed? (By hand/Weeder/Herbicide)

2.6. How do you plant? (Direct seeding in lines/Transplanting/Broadcasting)

2.7. Do you use any farming chemicals? If yes, what type do you use?
(Fertilizer/Pesticides/Herbicide)

2.8. How do you water the crops?

2.9. How do you harvest your crops?

2.10. Do you know of any technology that can be used in farming? If yes, what is it?

3. Post-harvesting techniques

3.1. How do you measure your harvest? (Sacks, Kilograms/Pounds)

3.2. In the most recent harvest season, how many different types of crops did you harvest in total?

3.3. What has been your highest yielding type of crop?

3.4. How do you store your crops?

3.5. Do you sell your crops?

3.6. If yes to 3.5, where, how and to whom do you sell your crops?

3.7. What percentage of your crops do you sell?

3.8. How do you package your crops before selling them to the market?

SECTION 2. TRAINING NEEDS ASSESSMENT

4. Needs Assessment

- 4.1. Have you heard of any agricultural trainings in the past 3 years? If yes, what prevented you from attending the trainings that you heard of?
- 4.2. Do you want to attend trainings on farming techniques? If yes, name 3 topics that you want to get trainings on.
- 4.3. Do you want to attend trainings on soft skills? If yes, name 3 topics that you want to get trainings on.
- 4.4. Is there any other type of training that you want to attend?

5. Training Methods

- 5.1. Describe for me the way a training should be conducted to help you learn the most?
- 5.2. Describe for me the type of trainer that you would want? Do you want a trainer from an agricultural institute, or a farmer? Someone from your community?

6. Logistics

- 6.1. What is the most convenient time for you to attend training programs? (Date/Time)
- 6.2. Where the trainings should be conducted? How far should it be away from your home?
- 6.3. Is there anything else we could do to make it easier for you to attend the trainings?

END OF SURVEY

*“To continue monitoring the progress of all farmers involved in this project, we intend to do a follow-up survey in a few months. Are you fine with allowing us to return for another interview in the future?” (YES / NO) If NO: Why? If YES, could you please provide us with your below information?

Respondent No.: _____

Name: _____

Phone: _____

Address: _____

THANK YOU SO MUCH FOR YOUR PARTICIPATION!

BACKGROUND INFORMATION

1. Individual Information

- 1.1. What is your age?
- 1.2. How should we contact you in the future?
- 1.3. Are you working at the moment?
- 1.4. If yes, are you working full-time or part-time?
- 1.5. What is your marital status?
- 1.6. What is your formal educational level?
- 1.7. What is your current job(s)?

2. Family Information

- 2.1. Do you live in a nuclear or extended family?
- 2.2. How many people are there in your household?
- 2.3. Do you have children? If yes, how many children do you have?
- 2.4. How many of your children attended or are attending school?
- 2.5. What are your family's biggest challenges?

3. Financial Information

- 3.1. What is your current gross income (UGX per year)?
- 3.2. What is your current gross income from farming (UGX per year)?
- 3.3. What is your biggest expense in your home?
 Food () Healthcare () Education ()
 Housing () Church () Agriculture ()
 Other (), please describe _____
- 3.4. What are your other sources of income?

