

**ARE MOBILE PHONE-BASED INFORMATION SERVICES MAKING A
POSITIVE DIFFERENCE TO THE LIVELIHOODS OF KENYAN
SMALLHOLDER FARMERS?**

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LIST OF ACRONYMS, ABBREVIATIONS AND TRANSLATIONS

FAO	Food and Agriculture Organization
FFS	Farmer Field School
FGD	Focus Group Discussion
ICT	Information and Communications Technology
M Service	Any service that can be accessed through a mobile device
NGO	Non-Governmental Organisation
ROI	Return On Investment
Shamba	Farm (in Kiswahili)
SMS	Short Message Service
T&V	Training and Visit System
UN	United Nations

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ABSTRACT

This paper seeks to explore if mobile phone-based information services are making a positive difference to the livelihoods of Kenyan smallholder farmers. The study examines iShamba, a mobile phone-based farming information service that disseminates relevant and timely agricultural information to Kenyan smallholders in order to improve their yields. By analysing primary data, obtained through in-depth qualitative research, this study aims to identify any increases in productivity and income directly derived from the application of information that farmers received from iShamba. This study is concerned with the nature of change, rather than how widespread the change is.

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Above all I would like to thank David Campbell, Director at The Mediae Company for enabling me to access iShamba, its smallholders and other invaluable members of staff for this research. Without David this research would not have been possible. Many thanks to the farmers, who gave up their time to take part in the focus group discussions. Many thanks also to Professor Nigel Poole for all his helpful suggestions throughout this research.

1.0 INTRODUCTION

1.1 Context

The elimination of poverty, hunger and malnutrition by 2030 are key targets of the post 2015 development agenda (FAO et al, 2018). It is argued that agriculture is fundamental in the process to alleviate poverty and hunger due to poor peoples reliance on it. Approximately three-quarters of the economically active rural populations of sub-Saharan Africa consist of smallholder farmers – many of which are poor or exceptionally poor. These smallholders tend to rely on their land not only to earn a living but for the majority of their own food consumption (FAO 2015).

These farmers face a host of challenges and a lack of training and technology, inadequate inputs, limited finance and poor market linkages are common barriers faced by all (Farm Africa 2019). Their susceptibility to climate change and a lack of feasible insurance options exacerbate these challenges further and place agriculturally dependent households in an extremely vulnerable position (FAO 2015).

This situation is further compounded by an inadequate supply of agricultural extension services (FAO 2015). Agricultural extension services can provide vital support services to smallholders, helping them boost their productivity, increase their food security and generally improve rural livelihoods (IFPRI 2019).

ICT is playing an increasing role in the provision of agricultural extension through the delivery of mobile phone-based information services. However, empirical evidence on the value of such services is limited and those that do exist seem to only focus on the impact that the provision of market and weather information can have on smallholders' income. Research in this area is also frequently scrutinised for failure to establish attribution of the services provided to the outcomes achieved (Baumüller 2016).

1.2 iShamba

This research focuses on iShamba and the impact it is having on agricultural production, productivity and the livelihoods of Kenyan smallholder farmers. iShamba is a mobile phone-based information service and call centre that disseminates relevant and timely agricultural information to Kenyan smallholder farmers in order to improve their yields (Mediae 2019).

Farmers pay to receive the following services contained in the premium package:

- Access to iShamba WhatsApp group
- Receive agricultural tips on four commodities of their choice
- Get weekly, monthly and seasonal weather updates
- Receive market prices from two main markets
- Access to iShamba call centre of experts
- Access to iShamba experts via SMS question service
- Alerts on farmer events in their area
- Occasional SMS from iShamba partners (Mediae 2019).

In order to establish if iShamba is making a positive difference to the livelihoods of the smallholder farmers it serves, evidence of increased agricultural productivity and household income needs to be demonstrated, through the application of knowledge supplied by iShamba.

1.3 Research questions

The research questions to be addressed are:

1. Does iShamba increase agricultural productivity
2. Does iShamba increase household income

This paper draws its conclusions from in-depth qualitative research undertaken with 33 iShamba farmers. The study is concerned with the nature of change, rather than how widespread the change is and was designed to capture the action of causation. The aim of such an approach is to determine if any uplift in productivity and profitability can be directly attributed to the application of knowledge obtained from iShamba.

2.0 BACKGROUND

2.1 The importance of agriculture today

Agriculture is fundamental to poverty and hunger alleviation initiatives (FAO 2015). However, public investment in agriculture is declining on a global scale despite the fact that hunger is once again rising and millions of children are feeling the impact in the form of under nutrition (UN 2019).

Goal number two on the 2030 agenda for sustainable development is;

End hunger, achieve food security and improved nutrition and promote sustainable agriculture (UN 2019).

For this to happen, all forms of malnutrition must be eradicated. The doubling of small-scale food producers' agricultural productivity and incomes also needs to occur. This includes equal land access, the provision of productive resources and inputs, information, financial services, improved market linkages and opportunities for employment in non-farm sectors (UN 2019).

Sustainable food production systems also need to be guaranteed and resilient agricultural practices implemented in order for productivity and production to increase. This must support the maintenance of ecosystems and bolster capacity building efforts to enable adaption measures to climate change, whilst improving the quality of land and soil (UN 2019).

2.2 Climate change

Climate change poses a huge threat to such initiatives and is having a drastic impact on agriculture and food security. This makes the promotion of sustainable agriculture along with ending hunger, food insecurity and improving nutrition even more challenging (FAO et al, 2018).

In tropical and temperate regions the production of major crops, such as wheat, rice and maize are being negatively affected by changes in climate. Adaption is required to cope with rising

temperatures, which will only exacerbate the situation. Natural hazards of course have a huge impact on food production, with drought claiming 80% of agricultural losses – particularly crop and livestock (FAO et al, 2018).

Rainfall seasons are also changing e.g. the rains starting later or earlier than anticipated and unequal allocation of rainfall and temperature fluctuations within the season. This variability in climate can affect crop growth and readiness of pasture for livestock – the knock on effect on food security and nutrition is significant (FAO et al, 2018).

On a subnational scale climate variability can have a devastating impact on smallholders, whose losses in production are hugely detrimental for their own livelihoods – threatening their food security and nutritional intake (FAO et al, 2018).

2.3 Agriculture in Kenya

In Kenya, agriculture is the dominant income source in rural areas and is key in driving economic growth. According to the World Bank (2019) economic analysis, the agricultural sector accounted for 21.9% of gross domestic product (GDP) from 2013-2017 and in 2017 provided employment for 56% of the work force. Agriculture also accounts for 65% of Kenya's exports – making it central to the country's development agenda. However, despite this there has been a decline in the value of agriculture – mainly due to weather related shocks, pests/disease and less than adequate extension systems (World Bank 2019).

In order for the Kenyan agricultural sector to be transformed, access to agricultural financing needs to be achieved. It was also found that the use of fertilizer in Kenya is not sufficient and that government subsidy programmes need to include smallholder farmers and not just target medium to large scale farmers. To progress smallholder farmers from subsistence producers into prosperous agribusinesses then structured commodities trading needs to be established as this will help reduce inefficiencies (World Bank 2019).

Kenya's agriculture is wholly dependent on rain and so is extremely susceptible to drought. Adaptive measures need to be implemented, such as irrigation systems and water management programmes for smallholders, which would increase productivity. Numerous Kenyan smallholders are absent from agricultural value chains because they are so geographically dispersed. This positions them at a total disadvantage due to the increased production costs and lack of competition that's caused by such dispersion. Farmer organizations (FOs) offer a solution here as they enable the financial inclusion of smallholders and strengthen their market power – leading to increases in productivity and income (World Bank 2019).

2.4 Agricultural Extension

Anderson and Feder (2004), describe agricultural extension as a form of education that introduces new knowledge and technology to farmers. For sustainable agriculture to prevail small scale food producers are in urgent need of greater support via improved investment in infrastructure and technology, along with an adequate supply of agricultural extension services (FAO 2015).

It is argued that information and knowledge are vital contributors in alleviating the poverty of smallholder farmers, which is why agricultural extension services have been in existence for decades – varying in both form of provision and in the delivery itself (Anderson and Feder, 2004).

There has been no shortage of investment in a broad range of public extension services over the decades, however extensive evidence on how such services have impacted knowledge, adoption and productivity is extremely limited (Aker 2011).

2.5 Evolution of extension and advisory services in Kenya

Kilelu et al (2018) describes how these services originally provided a platform for government agencies to enable mainly smallholder farmers to increase production via access to technologies, skills and knowledge. This was also accompanied by market information. Due to limited funding and insufficient human resource, the approach became dormant and services transitioned to a pluralistic system, which is predominantly market driven. Private sector consultants, inputs and technology providers, NGOs and ICT-based service providers now deliver these services at county level. Local governments control key functions such as public extension and advisory service delivery and national government focuses on the policy framework. Private sector service delivery is promoted by both levels of government, with financing for the subcontracting of private sector actors mainly coming from donor funded projects (Kilelu et al, 2018).

3.0 LITERATURE REVIEW

3.1 The role of ICT

The provision of ICT services in remote communities is imperative to create sustainable growth and improved lifestyles. People are otherwise unable to contribute to economic, social and political life, which is becoming more and more digitalised. Its importance is reflected by the fact that some people in low income communities, when asked, said they are willing to spend what little money they save on ICT options (Nandi et al., (2016).

Rural communities' access to technology and information has been a persistent issue, often cut off and unable to connect to the communication services they so vitally need. This issue has been named the 'last mile' due to the expense of the telecommunications infrastructure required in connecting rural customers who are widely dispersed and located in isolated areas (Gregson et al, 2017).

ICT can disseminate information to a large number of farmers and can bring a whole plethora of opportunities to rural communities. It reduces the need for costly extension staff and can drastically improve the information flow to rural communities and act as a tool to connect people, which helps remove the barriers that illiterate farmers can come up against when trying to access extension systems (Asenso-Okyere and Mekonnen, 2012).

Gregson et al (2017) argues that the most significant ICT phenomenon is the mobile phone. It has rapidly been adopted across the globe, enabled by wireless communication ensuring it is now a mainstream technology, which the poor are increasingly relying on. This ever-expanding access to both information and ICTs has been heralded as having huge potential for the poor in breaking down the barriers that exist in accessing information. It has also brought opportunities in the delivery of agricultural extension services to farmers across the globe – providing smallholder farmers with improved service delivery (Gregson et al, 2017).

3.2 The issue of evaluating impact

Large-scale agricultural extension services are often measured with regards to accessibility, scalability and impact according to Anderson and Feder (2004). Juma, C et al (2013) supports this approach to evaluating impact and describes impact in terms of scalability and how many people have benefitted from a programme. Time and duration of a programme is also important, as it needs to have been operating long enough for significant improvements to be noted and to demonstrate sustainability. Proven impact requires rigorous impact assessments in order to gain evidence of measurable gains at individual or household level.

As with more traditional extension services – the actual quantifiable impact of ICT services proves to be a huge challenge. Results from various programmes can seem impressive but data challenges along with econometric issues in assessments conclude that results need to be carefully interpreted (Anderson and Feder, 2004).

Aker (2011) describes how with all the many ICT extension tools out there the difficulty is attributing the impact direct to the service itself. For example there have been reports of many positive behavioural changes, increases in yields and income, but it is a challenge to establish if the access to mobile phones has the biggest impact. It therefore must be questioned if the impact is generated due to the ICT service or the actual use of the mobile phone in general (Aker 2011).

It is also difficult to establish if observed outcomes both pre and post intervention are attributed to the ICT based agricultural programmes provided or are other factors at play. The causal effect of programmes needs to be identified. It is also hard to decipher how exactly ICT-based services actually transform smallholders' admission to information, knowledge and adoption (Aker 2011).

This study will assess the direct impact iShamba is having on productivity and income, as well as indirect impacts on smallholder livelihoods overall.

3.3 Agricultural extension M-services in Kenya

According to Baumüller (2016) Kenya is seen as a trailblazer in Sub-Saharan Africa with regards to agricultural m-service development. However critically evaluating their impact is difficult due to very little available data on the actual users' experiences.

Agricultural m-services can be divided into four groups:

- Information and learning
- Financial services
- Access to agricultural inputs
- Access to output markets.

There are several organisations providing similar, yet different, services to iShamba.

iCow – a mobile agricultural platform designed to support farmers with livestock and crop production. It is designed for the most basic of mobile phones and operates in Kenya, Tanzania and Ethiopia. Farmers receive SMS messages with information on best practices (iCow 2019).

Precision Agriculture for Development (PAD) – is an SMS-based advisory service for maize farmers. They provide input recommendations regarding local soil tests and also offer information through phone calls and an e-extension system (PAD 2019).

Kenya Agricultural Commodity Exchange (KACE) - Information is obtained on the price of commodities in various different markets, daily. This information is then communicated to farmers in real time. KACE acts as the intermediary in the hope of empowering farmers through the provision of market information, capacity development and through business and technical training. Competitive bids and offers to trade and once an agreement is reached between seller and buyer, KACE organizes financial and logistical parts of the sale, for a commission. This provides farmers with both options and bargaining power (KACE 2019).

SokoPepe - this social enterprise supports Kenyan farmers via the provision of market information and a management service for farm records. Soko+ links small scale farmers to end-retailers/bulk purchases of produce – effectively a digital commodity trading and information system. (SokoPepe 2019).

Sokoshambani - supports small-scale potato farmers by providing access information on market prices, micro-finance institutions, farm inputs, training materials and provides a direct link to buyers from fast food restaurants (RelifWeb, 2019).

M-Farm is a web application service, which connects buyers and farmers. It also provides monthly analysis of crop prices in different markets, enabling farmers to better plan on what to plant and when and make economic decisions around pricing and when to sell produce (M-Farm 2019).

3.4 A review of agricultural extension delivered by ICT

A previous iShamba study tracked the changes in productivity amongst iShamba subscribers. The report presented the production outcomes for baseline and follow up across iShamba subscribers and non- subscribers on two different crops - maize and potato, and two livestock, dairy and poultry. A baseline survey was carried out in 2014 and a follow-up survey followed in 2015.

It was evident that iShamba subscribers had positive feedback about the service and stated that they found the information to be useful. Although it was widely reported that these changes made a difference to farm production, this was not reflected when tracking outputs/yield across baseline and follow-up for maize and dairy production.

However, results demonstrated that potato production significantly increased in yield output amongst iShamba subscribers. This significant finding could be explained by the fact that the potato is a relevantly new crop in Kenya compared to maize for example. Therefore, farmers may be more willing to change practices around growing this crop and adopt new practices. Crops like maize have been farmed in the same way for generations and this could possibly result in a resistance to change. Another important point raised was that potatoes are grown as a cash crop, with an existing market and are not grown solely for own consumption.

The results from this study necessitated that more in-depth qualitative research was required to measure the nature of change as opposed to how widespread the change is.

Baumüller (2016) explains how empirical evidence on the value of m-services is limited and those that do exist seem to focus on the impact that the provision of market and weather information can have on smallholders' income.

An iCow (2019) impact study conducted in 2010 found that due to the provision of information through iCow, users were able to increase their productivity, with 42% reporting an increase in their income. Over half said that this was due to increasing milk yields from 1.5 to 3 litres per lactating animal.

KACE (2019) state impact has been evident depending on several variables – commodity, location and season. Improved earnings were recorded from 22% - 150%. Better quality and lower priced commodities are made available and with more reliable access to bulk buyers, manufacturers, cooperatives and exporters. In areas where KACE operate, 80-90% of farmers use the service and have said to have achieved higher prices for their commodities (KACE 2019).

Baumüller (2016) conducted an M-Farm case study, which found that farmers use their price information in the planning of their production processes. Price enquiries aren't just sent at the sales stage either but also at the initial stages of production. Interestingly, information about demand guides decision making more so than price information. Changes in cropping patterns have also been influenced by price information but there was little uptake in the introduction of new crops. Whether or not price information enabled farmers to gain better prices was not confirmed by this case study even though farmers themselves believed they were able to obtain higher prices. This increased income could however be attributed to changes in cropping patterns or harvesting times (Baumüller 2016). A third of farmers in this study still use the radio to get price information despite being an M-Farm user. They viewed the radio as a valid source of information especially in the initial production phase. Just before selling is when M-Farm is said to be more useful as an information source (Baumüller 2016).

Fafchamps and Minten (2012) critically assessed weather, market and agronomic advisory information provision via an SMS-based service to Indian farmers. This was a commercial service called Reuters Market Light (RML). The aim was to determine what benefits these farmers had derived from such a service. A controlled randomized experiment was implemented in Maharashtra in 100 villages. Farmers received a 12-month free trial with RML. The degree of these effects were small and the results did not show a statistically significant effect on the price farmers received, the loss of crops due to unforeseen weather conditions or on the prospect of farmers changing crop varieties and husbandry practices. Also noted was that the 12 month free trial did not impact transaction costs or incentivize farmers to reduce the cost of searching for price information (Fafchamps and Minten, 2012).

An experimental study conducted by Camacho and Conover (2011) in Colombia, aimed to assess the impact of information delivery via SMS on price and climate information in the agricultural sector. The aim was to analyse whether price and weather information recipients would alter what they planted and if they benefited from an increased price at a regional market. The results revealed that those farmers who received SMSs were more informed about prices in different markets and had a more accurate expectation on the value of their crops, which was to be expected due to the frequency of SMSs during 6 months. However, despite this information they did not receive higher sale prices than those not provided with the service. An explanation for this finding is not explored in the paper. Farmers were positive about the SMS information but viewed it as a complementary source of information. Note that knowledge gains from the content of the SMS, was not assessed in this study either (Camacho and Conover, 2011).

Parker et al. (2016) investigated the adequacy of ICT in delivering information technology in India's agricultural markets. Two crops were selected and the impact of information provision on geographic price dispersion was analysed (Stork et al, 2018). There was an unexpected ban on mass SMSs in India for 12 days during the study period. This enabled the study to ascertain if the availability of information had an impact on crop prices (Stork et al, 2018). Results demonstrated that impact was linked to the number of users and crop perishability. However an increase of 5.2% on the average spatial price dispersion for 170 crops across 13 states during the time of the ban was noted (Stork et al, 2018).

Although the Parker et al. (2016) study highlighted the impact that an electronic price system can have on price dispersion, evidence from other studies has not been wholly significant or conclusive. However, substantial differences between control and treatment groups of such studies don't necessarily determine that no benefits were incurred by such services.

Stork et al, (2018) argues that lack of significant difference between control and treatment groups of other studies may purely be because of the standard of service the treatment groups received.

If the example of a weather based SMS service is taken – the control group farmers maybe have sought the relevant weather information from certain sources. Those in the treatment group would have received the weather based SMS but may prefer to gain information from alternative/more traditional services (Stork et al, 2018). There might also be issues around using the SMS information effectively or they may simply not do anything with the information as they don't trust it enough to actually act on it and make the changes required to have a positive impact on their livelihoods (Stork et al, 2018).

Although there are a number of different m-services available to smallholders they of course vary considerably in the actual services they provide and so there are no like-for-like comparisons for a service like iShamba, operating in Kenya – that offers the specific suite of tools iShamba offers. This study is therefore contributing to the literature by carrying out an in depth qualitative analysis on this particular service, which offers multiple information channels via a mobile phone. In depth knowledge can also be gained on user experience through the use of FGD and the casual effect of iShamba can be identified.

3.5 Brief review of traditional forms of agricultural extension services

Traditionally, T&V, FFS and Extension Officers were the most common form of agricultural extension service (Aker 2011).

T&V uses agricultural experts and field staff to disseminate technical information to selected rural communities. Farmers who have adopted new technologies effectively are then selected and trained by field staff in the hope that they will then go onto train others within their community (Aker 2011).

T&V – was supported by the World Bank from 1975-1995 and consisted of a fairly centralized, state-led, publically financed extension programme (Anderson and Feder, 2004).

Bindlish and Evenson's work (1997) on the impact of T&V in Africa provides evidence from Kenya demonstrating that T&V can add value to extension services and contribute to

agricultural growth - bringing about a notable return ROI. Data highlights that areas with accessible extension services have higher yields than those who don't but those with the uppermost yields are those farmers who directly engage in extension services. Bindlish and Evenson (1997) can be criticised for taking a rather narrow view of what constitutes, impact and appear to only take into account productivity levels.

FFS also approach farmers to train others in the community and share information. The model uses participatory training schemes to build the capacity of farmers (Aker 2011). They are generally publicly funded extension programmes that grew in popularity at the start of the millennium and seek to educate farmers on agro-ecosystems analysis. Anderson and Feder (2004) argue that such a method is hard to sustain due to cost and so scalability is unlikely meaning that they fail in enabling a broad range of farmers to be positively impacted (Stockbridge and Dorward, 2015).

Godtland et al, (2004) describes how results from impact evaluations have been varied – depending on the benchmarks used to assess impact and the evaluation methods adopted. It has however been noted that FFS participants do experience an elevated level of knowledge.

4.0 METHODOLOGY

4.1 Approach

This qualitative research was conducted with support and assistance of Mediae and focuses on iShamba extension services to smallholder farmers. Mediae is a small social enterprise who are agricultural and communication experts in east Africa. iShamba is one of their products, which is a mobile-based farmer information service and call centre that disseminates relevant and timely agricultural information to Kenyan farmers in order to improve their yields (Mediae 2019).

Farmers pay up to 8US\$ annually, to receive the services contained in the premium package:

- Access to iShamba WhatsApp group
- Receive agri-tips on four commodities of their choice
- Get weekly, monthly and seasonal weather updates
- Receive market prices from two main markets
- Access to iShamba call centre of experts
- Access to iShamba experts via SMS question service
- Alerts on farmer events in their area
- Occasional SMS from iShamba partners.

A qualitative approach was chosen for this study because it enables in-depth research to be carried out, which can better understand the nature of change, rather than how widespread the change is. A qualitative approach can better capture the action of causation, which is required to see if the application of knowledge obtained through iShamba is resulting in an uplift in the productivity and profitability of their users.

Primary data was collected via four FGD each consisting of eight or nine premium iShamba farmers. The FGD were conducted between 11th to 20th June 2019 and held in towns centrally

located within the selected counties. These were – Ruiru (Kiambu county – Central Region), Machakos (Eastern), Nakuru (Rift Valley) and Kakamega (Western).

A total of 12 questions were discussed by FGD. Data was recorded via note taking and each FGD was also audio recorded to avoid any issues with taking notes accurately on exactly what people say and who said what. Audio recording also enabled the tone of how someone says something to be captured. Such nuances cannot be recalled when note taking (Bryman 2016). A FGD guide was compiled prior to the FGD, so the moderator (an iShamba employee who speaks both English and Kiswahili) could prepare in advance and was able to better explain to FGD participants exactly what to expect. See Annex A.

FGD participants were also asked to complete a personal details form at the start of each session, this was to better understand the sample demographic. See Annex B.

In order to establish if iShamba is making a positive difference to the livelihoods of the smallholder farmers it serves, evidence of an increase in agricultural productivity and household income needs to be demonstrated, through the application of knowledge supplied by iShamba.

The broader research questions addressed were:

1. Does iShamba increase agricultural productivity
2. Does iShamba increase household income

As previously mentioned the issue with previous studies/data is establishing attribution. The questions compiled for the FGD were designed to capture the action of causation e.g. what do iShamba premium farmers actually do with the information they gain via iShamba. Do the results actually show the uptake and application of information and what are the impacts on productivity and profitability?

Data from the personal details form has been analysed and explored via an Excel pivot table report, so that the sample demographic can be better understood.

The FGDs generated qualitative data and so a coding procedure was applied to break the data down into manageable chunks in preparation for thematic analysis.

Through the inclusion of quotes and case studies it is hoped that causation can clearly be identified e.g. when farmers received knowledge from iShamba, they detail what they did with that information and the steps they took to apply it. This will enable the analysis of the outcome to be carried out and determine if iShamba has actually had a positive impact with regards to income and productivity of this particular group of Kenyan smallholders.

4.1 The sample

A sample was taken from the population of iShamba premium farmers, of which there are 1806. The population is predominantly male with an average land size of three acres. See figure 3 and figure 4.

Due to limited resources and time restrictions, four regions out of seven were selected as the focus for this research. Rift Valley, Eastern and Central were all selected because the majority of iShamba premium farmers are based in these regions, as demonstrated in figure 1. The reason

Western was chosen instead of Nyanza was due to there being a high number (43%) of iShamba farmers located within a certain county (Kakamega) and so a strong response rate was anticipated. The sample provides regional representation with regards to ethnicity, crops grown and livestock kept. The county with the highest number of iShamba premium farmers was chosen in each of the regions.

iShamba farmers within the four chosen counties were self-selecting. An SMS message was sent to all iShamba premium farmers within these counties inviting them to take part in this research. If they responded yes, a follow up call was made, explaining more about the research, time commitment required, along with other basic details. 12 farmers from each county were recruited in anticipation of a drop-out rate. A total of 33 farmers took part in this study – nine in Western, eight in Eastern, eight in Rift Valley and eight in Central.

Figure 1. Geographical breakdown of population of iShamba premium farmers

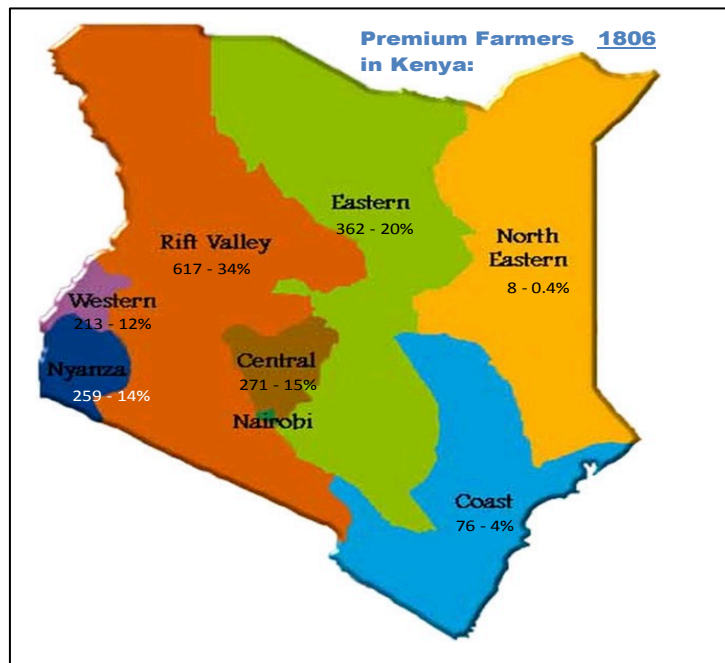


Figure 2. Geographical breakdown of population of iShamba premium farmers

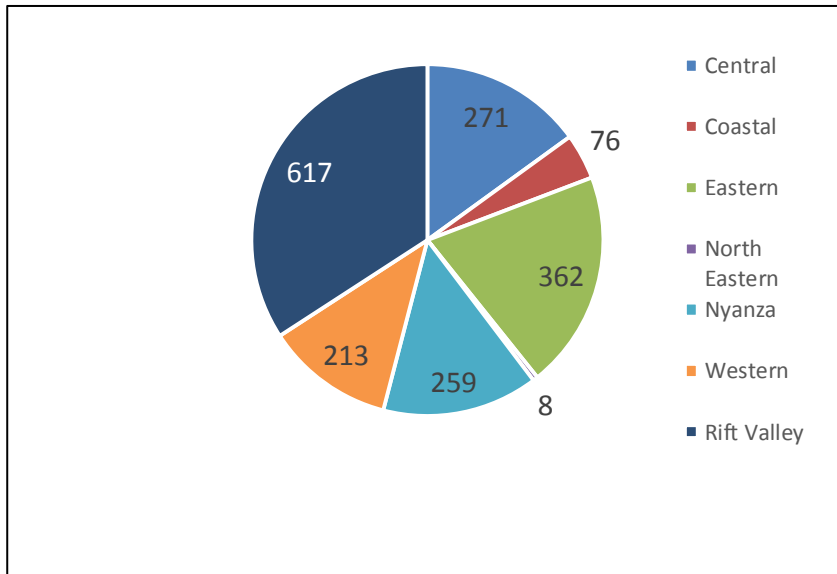


Figure 3. Gender breakdown of iShamba premium farmer population

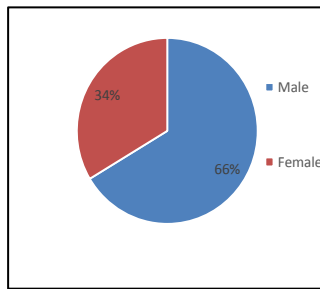
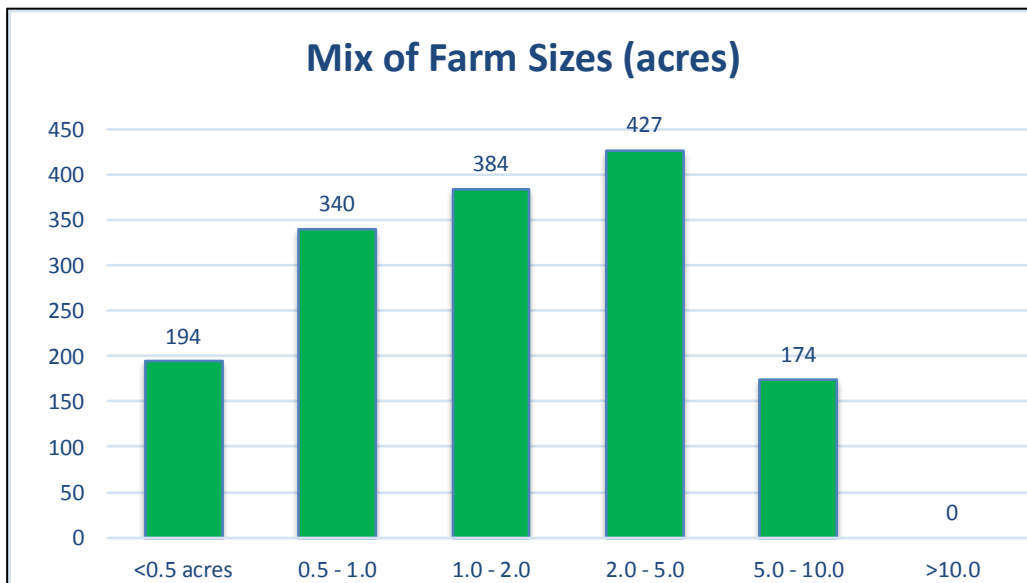


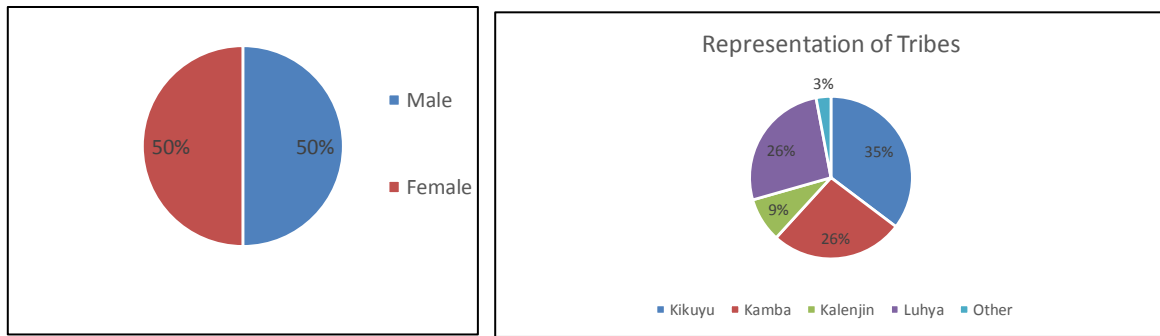
Figure 4. Land size of iShamba premium farmer population



*The data for farm size was only 84% complete

Sample demographic.

Figure 5. Representation of the sample's gender. Figure 6. Representation of tribes within the sample.



Despite the self-selecting process, an equal representation of both men and women was achieved, as demonstrated in figure 5. The largest ethnic groups in Kenya, comprise of Kikuyu, Luhya, Kalenjin and Kamba, so representation across these tribes was also achieved – demonstrated by figure 6. The majority of these farmers are educated to secondary level with 35% also having attained a diploma. It is important to note that any impacts, could potentially require this level of education and so, cannot be generalized to those having attained a primary education or less.

Figure 7. Representation of education level achieved by the sample

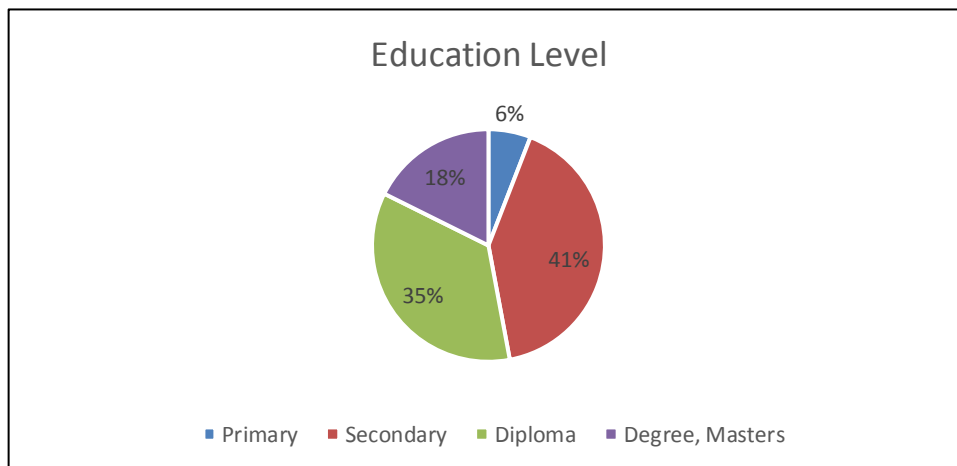


Figure 8. Representation of the sample's crops and livestock

<p style="text-align: center;"><u>Vegetables</u></p> <p>Greens Chinese Beans Cabbages Capsicum Arrow Roots Terere Managu Beans Sukuma Spinach Potatoes Kale Peas Kunde Carrots</p>	<p style="text-align: center;"><u>Fruits</u></p> <p>Bananas Pumpkin Avocado Pawpaw Tomatoes Mango Oranges Limes Water Melon Black Nightshade</p>
<p style="text-align: center;"><u>Crops and Others</u></p> <p>Coffee Maize Sugar Cane Finger Millet Sorghum</p>	<p style="text-align: center;"><u>Livestock</u></p> <p>Goats Chickens Cows Sheep Pigs Turkeys</p>

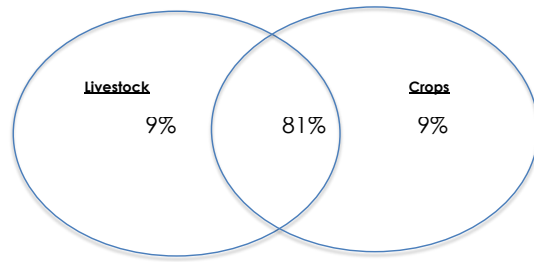


Figure 9. Representation of the sample's crop and livestock

Agricultural households will normally carry out a diverse range of activities in order to generate income and studies have shown that the smallest farms in most countries rely on crop and livestock production for 40% or more for their total income (FAO 2015). The majority of the farmers who took part in this research have adopted livelihood strategies based on part-time farming, with other activities contributing to their income e.g. teaching, selling second hand clothes, civil servants etc. They farm land averaging between 2-5 acres or below half an acre (figure 10) – consisting of various crops and livestock (figure 8 and 9) and earned a monthly income of between 0-10,000Ksh (figure 11).

Figure 10. Representation of the sample's land size

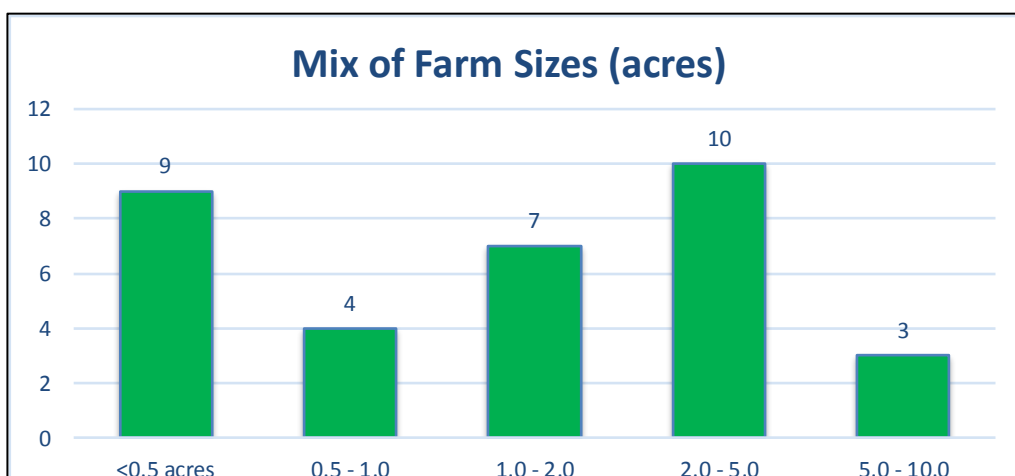
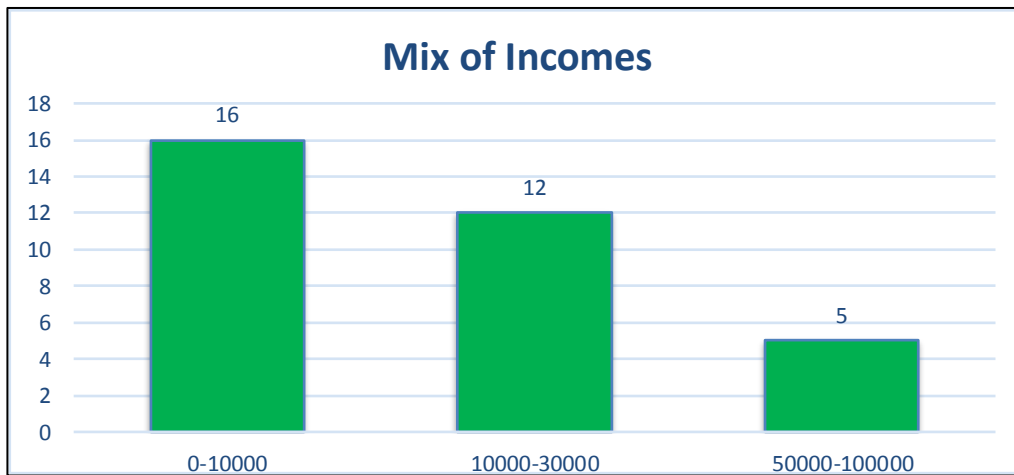


Figure 11. Representation of the sample's income



5.0 RESULTS AND DISCUSSION

This section has been divided into three sections. The first (5.1) is to gain a better understanding of how the sample are actually using iShamba – this is important to get an insight into how exactly they gain knowledge and information from the various different elements of the service. This will help to determine if any impact can be attributed to iShamba.

The second section (5.2) analyzes any increases in productivity and income. The results of which will be analyzed against the framework and concepts explained by Poole (2017) regarding market participation.

Enabling market participation - means the transition by farmers from subsistence farming to a position where they can engage with markets. This will likely involve an increase in the purchasing of inputs, with the goal of selling the outputs. This transition is determined by the farmers' ability to produce products of a certain quality and standard to satisfy market expectations. They also need to ensure a consistent supply and a viable price (Poole 2017).

In order for smallholder farmers to actively participate in markets certain costs need to be absorbed and these come in the form of observable (marketing costs e.g. transport, handling, packaging and storage) and unobservable transaction costs (cost of information search, bargaining, screening, monitoring, coordination, and contract enforcement). If farmers are unable to manage these transaction costs then they will likely be unable to participate in markets and their land will be used for subsistence purposes (Poole 2017).

The third section (5.3) seeks to explore any indirect/broader impacts of iShamba to help determine if the service is having a positive impact on the overall livelihoods of its farmers and section 5.4 explores any instances of farmers having lost money due to the application of information obtained from iShamba.

The results section concludes with 5.5 - a discussion regarding what other extension services are being used by the sample. 5.6 explores how iShamba can be improved according to the user experience of the sample.

5.1 How does the sample use iShamba

One of the first questions asked to farmers, was ‘has iShamba helped you and your farm?’ which was answered with a unanimous ‘yes’. This is perhaps not surprising seeing as these farmers pay for this service. The farmers then discussed how they used iShamba and explained which services they find most useful.

WhatsApp appeared to be the most popular tool on the iShamba premium suite of services, with 17 farmers describing how this is what they use most. Farmers are added to a WhatsApp group upon signing up for the iShamba premium service. These WhatsApp groups are devised for each county and encourage farmer-to-farmer learning. iShamba experts are also on each of the groups, to offer support and answers to specialist questions. The iShamba farmers described how they mainly use this tool for asking questions, exchanging views and to learn more on various topics. Other points discussed regarding its popularity, include:

- Saves time and money in information gathering
- Convenient
- Learn a lot from other farmer’s questions
- Quick response rate
- Can help with links to sellers of certain products
- Benchmark costs of inputs
- Uploading photos for diagnosis of pests in both crops and livestock
- Search function to establish if information required has already been shared.

“When it comes to issues of managing livestock and crops, I have really benefitted from the WhatsApp group and the call centre”. Catherine, Nakuru

The SMS question service, is a tool that every iShamba premium member can use, whereby they send a question to an iShamba expert, who will promptly respond. The 16 farmers who said they regularly use this service, do so for the following support:

- Problem shooting
- Expert advice
- To gain contacts for a certain product/agri specialist
- Research for the next season e.g. what to plant and when
- Advice and guidance on starting a new venture.

“I was helped - my soil was very bad when I started my vegetables but after I got the information through SMS I was able to get a good harvest. They gave me the contact of the soil experts who came to my shamba”. iShamba Farmer, Kiambu

From the four different FGD, nine farmers said that they utilised the weather function of iShamba but some questioned its accuracy and timeliness. A farmer from Nakuru explained to give an accurate forecast for an entire county just isn’t feasible due to size. However, a farmer from Kakamega said that the information was always accurate. Another, from Kiambu explained

that the forecast is often sent to him in the afternoon, which is too late. Others say they use it purely as a guide and it can help when determining what crops to focus on and it helps with prior planning as the information on the weather pattern can include the coming week and even the season. This information may be key in the course of action a farmer takes.

“I get a lot of services from iShamba - primarily the weather forecast. That one has helped me so much”. iShamba Farmer, Machakos

Few farmers mentioned the market price service but those who did said they primarily used it to price their crops appropriately or to help with research for the next season e.g. the optimum time of year for certain crops. One farmer explained how she made her own dairy feed, so it was a useful tool in indicating where she can buy the cheapest maize.

Those farmers who mentioned the call centre seemed to use it mainly for emergencies, for example when their livestock are sick.

The agricultural tips were mentioned as a good way to get information that isn't actively being sought.

5.2 Evidence of increased productivity and income

There is evidence to suggest that iShamba can enable market participation. It is of course not a viable solution as a stand-alone extension service but it can certainly help build capacity in some of the required areas.

5.2.1 Increased quality of product to satisfy market expectations.

There is substantial evidence arising from the FGD to suggest that iShamba has helped these farmers to transition from subsistence farming to participate in markets. iShamba has helped them with regards to increasing their inputs (note this is not financial help but rather advice on inputs), which has led to increasing the quality of their products (both livestock and crops) and made their livestock more productive and their crops higher yielding. Of course iShamba does not offer a holistic service which covers both observable and unobservable transaction costs but evidence from these focus groups suggests that the knowledge provided by iShamba and applied by farmers can aid such transition from subsistence to market participation.

“Last season I harvested 10 bags of maize and my neighbour didn’t even harvest anything. This is because I sprayed according to the tips I was given. So I sprayed my maize and it produced well”. This farmer from Machakos then went on to talk about a successful mango harvest and explained that prior to iShamba mangoes were kept purely for domestic consumption. **“Last season I harvested a lot of mangoes and I was able to sell them until April when other peoples’ mangoes were spoiling. I got a good price because there were no mangoes on the market”.** iShamba Farmer, Machakos

A female farmer from Kakamega kept chickens before she joined iShamba purely for subsistence. She admitted to not really knowing what to do or how to look after them. **“I had a lot of challenges because I wouldn’t even know what to give to the chickens if they were unwell but when I joined iShamba I learnt a lot and started rearing chickens with that information to sell”.** She further explained that she wants to scale up and is starting this process by constructing a bigger house for her chickens, again with information she has obtained from iShamba. She notes that **“You have to do it in the right way to avoid diseases and I know what medicine to give them. The chickens are now healthier and they don’t die like they used to. I’ve reduced my costs through the information I have got”.** This particular farmer also grows cabbages and through iShamba she has learnt about the different seasons and can see how much to sell her cabbages for. **“I know if I plant in a certain season I will be able to make more money. People are so willing to give information on Whatsapp”.** Jane, Kakamega

Another farmer from Kakamega spoke of the challenges she faced when she first started keeping cows and how iShamba has helped her learn as she goes along. **“I have never kept cows before and I had challenges with the calves. The first one died but through the call centre and WhatsApp I got information and learnt from my mistakes”.** One of her cows wasn’t being productive, so she was advised by iShamba to arrange for a vitamin A injection, which she said helped her cow. She also gained information on different types of cow feeds. **“My income has improved so much because I am now selling the milk. I was not keeping cows before iShamba”.** Zaittuni, Kakamega

A farmer from Nakuru explained how she was rearing chickens prior to joining iShamba. After joining iShamba she learnt about appropriate medication for her chickens and how to boost their health with multi vitamins. **“I used to sell a mature hen for 200Ksh but now I can sell for 500-600Ksh because they are bigger and healthier”.** Helen, Nakuru

5.2.2 Increased inputs to achieve higher yields

Obviously, increasing inputs can incur expense but those iShamba farmers which have done so are pleased with the results.

A farmer from Kiambu believes that the returns are better when you increase your inputs. **“If you are inputting more, definitely the commitment is high and at the end of it all you sell and you are seeing better returns - your income increases”**. Joel Machakos

“iShamba has brought me to a point where it challenges me to use money to get money”. This farmer from Kiambu elaborated further by explaining how he has bought new breeds of chickens, which are better than what he had before. He also now spends more on good food mixes and preferred medication for certain breeds of poultry. **“So I’m spending more but my profits are going up, not like before with the old ways of doing things. It is bringing a balance or is more than before”**. He admits that before iShamba it was trial and error and that we was keeping chickens purely for the sake of it but now he takes a professional approach. Joel, Kiambu

A farmer from Kiambu explains how iShamba has encouraged her to buy more inputs than what she was using before but she is ok with that. **“Before we used to spend money but you would get nothing in return, it was going to waste. I would then get frustrated but now even if you are spending money you are happy because you are sure you will get back your money and something a little bit more”**. Janet, Kiambu

5.2.3 Application of iShamba information to increase yields

iShamba farmers described how the application of information obtained via iShamba’s various tools has increased their maize yields and in turn, their income.

“iShamba has been beneficial and has helped me a great deal especially in maize farming”. A farmer in Kakamega described his lack of knowledge around maize farming prior to joining iShamba. He didn’t know which seed variety to plant in different seasons and spoke of how most people in his area proceed with planting any seed just because it is maize. **“But iShamba has helped me learn which varieties to plant and when”**. He went on to explain how he has become a mentor to his neighbours who often come and ask him, which seeds he is planting and this is due to the knowledge he has gained. Although he is spending more on seeds he believes his income has increased because he is able to sell more now due to his larger yield. Crispus, Kakamega

A farmer in Nakuru has followed tips about maize farming on the WhatsApp group, which he says has helped increase his harvest. **“For the first time last year I harvested 20 bags! I followed the tips on WhatsApp – planting, fertiliser application etc. It has really assisted me”**. He sold the maize but explained that he was required to increase his inputs to increase his yield but was still confident he made a profit. Samson, Nakuru

“Before I joined iShamba I didn’t know how often to top dress maize. So I used to only top dress at knee high but iShamba (via WhatsApp) said to do it twice, also at flowering stage”. This farmer from Nakuru said such information has really helped her to increase her income as she used to sell her maize for 30,000Ksh per acre but after top dressing twice she managed to sell 1 acre at 80,000Ksh. Anne, Nakuru

5.2.4 Cost of information search reduced (unobservable transaction cost).

Mobile phones are an effective tool in reducing some of the unobservable transaction costs previously mentioned. Farmers explained how iShamba has helped them to reduce both the time and money they were initially spending on sourcing viable information to improve their farming activities. Prior to joining iShamba these farmers were relying on fellow farmers as sources of information, which would involve visiting them on their farms, which would not only involve time but also incur transport costs. Such effort might also be met with little reward, if the farmer was unavailable or unwilling to share information. Another means of gaining information was to rely on agricultural companies (e.g. those selling fertilizers), for information about certain crops but a fee of 500Ksh is charged for a farm visit. iShamba has removed this unforeseen expense and provided a platform for any issues to be dealt with by uploading a photo to the WhatsApp group and asking for advice, or using the SMS question service or call center, all of which reduces both time and cost in accessing information.

A retired teacher from Kiambu, who now relies on her work as a farmer spoke of the frustration she faced before joining iShamba. **“I used to rely on other people who let me down. I got very frustrated as the information I was getting was costly and not good”**. She explained that she didn’t know anything about farming as she spent so little time on her shamba due to teaching but now she is retired she has to go to the shamba. **“Now I am able to like the work I do because I know what to do and what to expect and if I don’t know, I know where to go to get answers”**. Janet, Kiambu

5.2.5 Bargaining power (unobservable transaction cost)

A lack of sufficient market information can greatly inhibit the price farmers can achieve for their produce. Pricing information in rural areas is often inadequate, which prevents farmers from establishing the most profitable market in which to sell their produce. This lack of information can suppress competition, as farmers prefer to build long lasting relationships with few traders. The information asymmetries put farmers at a disadvantage as they are unable to effectively negotiate prices for their produce (Poole 2017).

iShamba, through the market price tool can better strengthen the bargaining power of their farmers when they come to sell their produce. Even though several farmers cited the tool as being inaccurate, it at least provided them with the knowledge of not to sell below a certain level. Some iShamba farmers use market price as a research tool, to ascertain when prices are highest for certain crops, which enables them to better plan what to plant and when.

“From the information on market price and the contacts I got, I have been able to sell my chickens at a higher price than I did before”. iShamba farmer, Machakos

5.2.6 Reduced costs

Farmers noted how iShamba has helped reduce their costs, enabling them to achieve a better ROI.

Farmers who have received information from iShamba regarding inputs and then actually implemented that knowledge, reported that they have been able reduce their costs. The inputs

vary considerably from drip irrigation systems to using livestock manure and rabbit urine for fertilizers.

"The drip irrigation for my vegetables, which I installed because of iShamba has reduced my costs of production". Joseph, Machakos

"The cost of my inputs have come down because of iShamba. I now use manure from my livestock for my crops, so I have saved money on fertiliser". Miriam, Kakamega

"I got information from iShamba to use rabbit urine as a fertiliser. This reduces the costs for me." Mwanahawah, Kakamega

5.2.7 Mitigate against loss of crops and livestock

As noted by (Poole 2017) smallholder farmers are exposed to a number of risks, partly due to environmental elements such as natural disasters, weather and pests. This places smallholders in a vulnerable position due to the likelihood of the occurrence of such an event and the resulting economic damage it might cause.

In the rural areas of many low and middle income countries livestock acts as an important asset and investments in livestock are made to protect against climate related disasters and rapid inflation. It is considered a coping strategy that can be used to generate financial capital in the unfortunate event of a drought or flood. Therefore any loss of livestock due to climate related issues represent an erosion of assets and an increase in vulnerability (FAO et al 2018).The loss of both crops and or livestock can therefore be hugely detrimental to smallholders and was a key theme that kept arising in the FGDs.

iShamba, through its provision of vital information has helped these farmers reduce their exposure to such risks and the advice given from agronomic experts and fellow farmers has enabled them to reduce the impact of pest attacks, drought or other impacts effecting productivity. iShamba farmers explained how through the application of knowledge received from iShamba the loss of crops and livestock has been much improved, saving these farmers from income shocks which can be hugely detrimental and impinge on livelihood security.

Much of the knowledge obtained and applied by iShamba farmers was regarding how to control and prevent outbreaks of disease affecting various livestock. With changing weather patterns having disastrous consequences on crop yields, some farmers spoke of how they have implemented irrigation systems in response to the advice they have received from iShamba, to help mitigate against such threats. The advice provided by iShamba to mitigate against such threats has also been as simple as connecting farmers to specialized agricultural vets or recommending a certain product.

One farmer in Machakos explained how she used to be unaware of certain diseases prevalent in poultry and in 2017 there was an outbreak of one such disease, which people within her community simply didn't understand. Almost all the poultry died as a result. **“I was with my friends discussing this and I took a photo and sent it to iShamba WhatsApp. I got a quick response saying that it could be prevented”**. She shared this information with her group of friends and they took their remaining poultry to be treated. The following season there were no losses. **“It has helped me and the group in my area”**. The treatment recommended was affordable according to this farmer and they shared the cost as part of their group e.g. they sent one person on a bike with the birds so they could get treatment. These birds were intended to be sold so any loss would have an impact on income. Caro, Machakos

A farmer from Kakamega said that he didn't know how to keep chickens prior to joining iShamba but after gaining information on agricultural tips via SMS he decided to give chickens a try. He now has a few chickens (for consumption and selling) and explained how iShamba has helped a great deal with the growth, feeding and disease control of his birds. He went on to describe how an outbreak of Newcastle disease killed many chickens belonging to his neighbours but he survived and he attributes this to the information he got from iShamba via SMS. Crispin, Kakamega

“I am very grateful because before I joined I lost many sheep due to lack of knowledge.” This farmer from Machakos described how his sheep were always getting diseases and that he didn't know how to prevent and control them. Since joining iShamba however **“there are less deaths and my sheep have improved”**. iShamba farmer, Machakos

5.2.8 Diversification

As demonstrated by this research, smallholders are a heterogeneous group and this is reflected in the different approaches they take to improve income generation – leading to diversification and/or specialization (Poole 2017).

Crop and livestock diversification can be seen as a risk avoidance strategy for smallholders. Farmers in the FGD described how through the provision of information from iShamba they were able to diversify into new crops and livestock, which has given them an additional means for income generation. It also helps balance their risk within the farm e.g. if one crop fails, the addition of new crops and livestock will hopefully fill that income deficit. Examples of diversification due to iShamba include; intercropping, adding livestock and bee keeping.

Although a few farmers spoke of some challenges in the initial stages of new ventures and some are yet to receive any financial gains from introducing new livestock and crops, it has given them scope to eventually expand in these areas and hopefully reap financial rewards.

There is also evidence of farmers enjoying success in their new ventures and wanting to transition into specialization in these areas as they feel it is more profitable. Specialization can enable smallholders to achieve better economies of scale but this needs to be supported by well-functioning markets (Klasen et al, 2016). Increasing income is of course key to escaping poverty but a concern with specialization is that it can put their livelihoods at risk. A Smallholder relying on a single crop, will be more susceptible to a pest infestation damaging that crop than a smallholder who has implemented a more diversified system (FAO et al 2018).

One farmer from Machakos was interested in poultry keeping but didn't know anything about it and was daunted as to where to begin. He contacted iShamba to get the information he needed to begin this new venture. **“I sold the first lot but experienced some challenges. I think there was misinformation on my behalf and I didn't implement the things I was supposed to do that iShamba advised, but I continued communicating with iShamba and the second lot are doing very well. I always get instruction from iShamba”**. He went on to express how he is in the process of transitioning from farming to purely poultry keeping due to the success he is having. **“In my area we do not have a great extension officer so all my information was iShamba – mostly from WhatsApp”**. Samson, Machakos

“I didn't know how to keep bees but following through Whatsapp information I tried myself with two beehives and I have now harvested two times.” This farmer from Kakamega went on to explain that the honey is purely for home consumption and for medicinal use when her children get a cough. **“I was not keeping bees before iShamba. I would like to expand on my harvest and begin selling it”**. Mwanahawah, Kakamega

5.3 Indirect impacts

5.3.1 Changing attitudes

Aside from increased production rates and income generations, farmers spoke about a change in their own attitudes towards farming and how because of iShamba they see it as a profession in itself, which has inspired them to be more professional with regards to how they operate within their farms. They spoke about the importance of record keeping, so they themselves can gauge any improvements regarding productivity and income and also record information obtained from iShamba, so they can refer to it at a later date. Some also spoke of feeling proud of what they do and the importance of changing attitudes around farming – that it can be profit making and isn't just a job for the poor and uneducated.

Record keeping is a new exercise one farmer from Kakamega has implemented due to iShamba. **“Some of these things you might be knowing them but with iShamba participation you realise the importance of record keeping and it helps you see if you are improving”**. Bon, Kakamega

“iShamba has helped me and transformed farming into a professional job. It has taught us to farm in a professional, profit making way not like before. It has really helped me boost my income”. This farmer from Nakuru went onto explain how farming in Kenya is often considered as a last resort in life. **“iShamba has made me feel professional and proud”**. Samson, Nakuru

5.3.2 How farmers use the additional income attributed to iShamba

Farm inputs

The majority of farmers ploughed any additional income gains back into their farms:

- Upgrading livestock enclosures e.g. improving structures
- Increasing livestock
- Buying inputs for next season e.g. seeds, tools
- Labour
- Granary expansion

Water management

From an economic standpoint, smallholders who rely heavily on rain fed agriculture are of course more vulnerable to drought than larger farms with alternative water sources. Irrigation systems help protect against the disastrous impacts of drought. (FAO et al 2018).

Water management was an area of concern for those farming in Nakuru and Machakos as unpredictable rains and drought have imposed greater risks on their livelihoods. They chose to invest in better water management by procuring water tanks and implementing drip irrigation systems.

“When farming we don’t have water - it is a big problem. If I had water I would leave my other job”. This farmer from Nakuru used the profit she made from her increased maize yield to buy a 10,000 litre water tank for her farm. She hopes to buy more water tanks in the future to help with water security **“so that when I want to put a seed bed in I can as I will be able to water it, even in dry season”**. She believes this would enable her to be less reliant on the rains and able to plant seedlings even before the rains come, so her plant will grow faster and she can sell the yield before the markets become flooded with maize. Anne, Nakuru

Leasing additional land

Leasing land to increase productivity was another investment these farmers put additional income gains towards. For example, a farmer from Kakamega explained how her shamba is very small, which means she can only grow maize but through her increased maize yield (which she

attributes to iShamba) she is now able to lease another piece of land to grow sugar cane.

Another farmer used the profits from the increased sale price of her hens to start farming some land, which she had idle. She attributed the increased sale price of the hens to iShamba, as they are now in good condition, so she can sell them for more.

School fees

Five farmers said that the additional income gains they attributed to iShamba were put towards school fees for their children.

A farmer from Kakamega uses the money she gets from selling milk to fund her child through secondary school. **“The money I get from selling milk I just send it to school directly”**. Zaittuni, Kakamega

5.4. Lost money/no gains

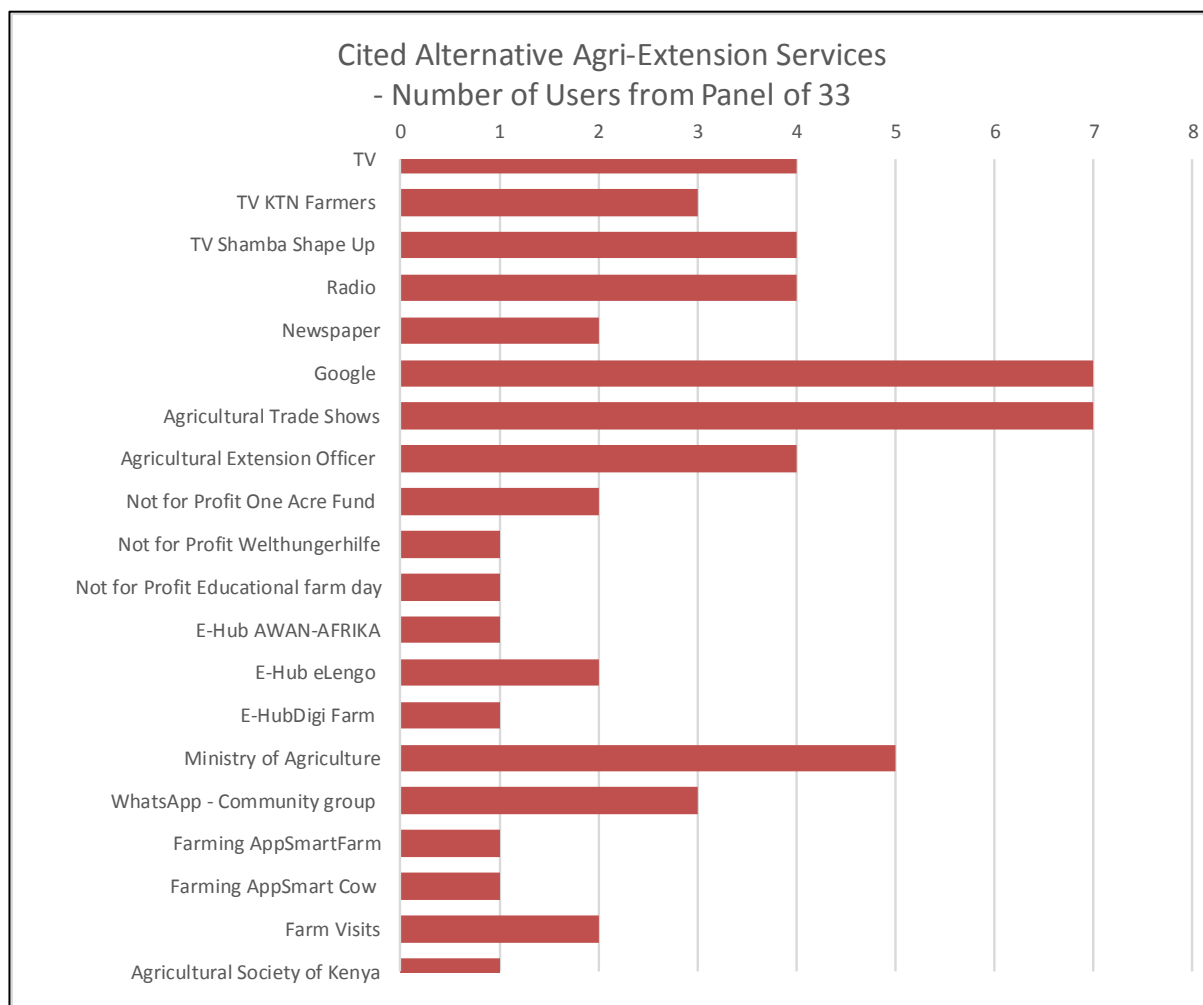
Despite all farmers unanimously stating that iShamba has helped them and their farms, interestingly three farmers did speak about losing money and making no gains. Yet, they did not attribute these losses to iShamba but to their lack of presence on their farms. They explained that they had obtained the knowledge but were relying on help at farm level to actually implement the changes, which they are reluctant to do. They however did trust the information and believe that if they were the ones to implement it that it would result in gains.

“For me I have not seen any money gained on top of what I used to but I have gained knowledge on how to go about it and how to be patient and not expecting too much”. This farmer from Kiambu spoke of how she used to plant maize and beans and had high expectations. When she had a poor yield she would become frustrated. **“I like more now the work that I do because I know where I am going and what to expect “**. Janet, Kiambu

5.5 Alternative extension services used by the sample

Alternative sources of agricultural information were discussed and farmers were asked to make comparisons between alternative information provision and iShamba.

Figure 12. Alternative extension services used by the sample



When asked how iShamba compares to these other information sources, the main points, which arose were centred around flexibility, reliability, speed, access to other farmers and convenience. A few example responses are listed below,

“iShamba you can get information at any one time, from any given member. In Western what is very popular is the One Acre Fund but you have to be there on the farm to get what you need. iShamba you use SMS, WhatsApp and anybody on the platform will give you the information you need. In fact you can sometimes be overwhelmed with information”. Bon, Kakamega

A farmer from Kakamega who predominantly uses the market price function of iShamba compares this tool with other information sources. **“The other sources can’t give you the price of certain commodities. There was a time I asked the cost of a certain product in a certain area and iShamba gave me the price”.** Abel, Kakamega

“Google is free but the information is reliant on uploads, not all of which are authentic”. Joel, Kiambu

“Extension officers – they go around trying to teach us but they are not real time. A month can go and you won’t see them. There is limited availability”. Bernard, Kiambu

“iShamba is more superior as you just get answers and it saves time. It is more effective than an extension officer, which takes time to reach”. iShamba farmer

It is perhaps not surprising then that all FGD participants, apart from three, credited iShamba as being the most convenient and trusted provider of agricultural information. The three that didn’t rank iShamba as the most helpful, said extension officers and farmer to farmer information provision was most effective for them. It is important to point out here that those who rated the extension officer so highly, lived within very close proximity to one, so they could drop in when needed and get direct 1:1 advice and at no cost (unless something needs to be done on the farm). The privilege of living so close to extension officers is probably something few farmers benefit from.

iShamba was credited with being:

- Trusted
- Impartial
- Reliable
- Efficient
- Convenient
- Interactive
- Economical

5.6 How can iShamba improve?

As has been noted with other agricultural m-services, that they are a complementary part of a bigger, more complex solution and as such do not act as a holistic extension programme and don’t aim to be. Gaps still exist which need filling but these are perhaps beyond the scope of such services with iShamba being no exception.

Market Price

The market price tool was mentioned by six farmers as needing improvement and its inaccuracy has actually cost some farmers both time and money, which didn’t arise during previous aspects of the FGD. Issues arose about inaccurate pricing, which weren’t representative of the price

when the farmer physically went to the market in question. Markets of differing sizes also need to be included, as it currently focuses on larger ones, such as Nairobi and Mombasa. What would also help these farmers is to post information on best markets to buy and sell produce e.g. the best place to sell maize is X or X market is currently buying milk at a high price.

“You read the price is X amount but when you get to the market the price has gone down. So the price you received on iShamba is not reflective in the market”. The farmer is likely to have already worked out their costing based on the information iShamba supplied. “When you reach the market – other farmers might be selling for half the price and by that point you have already paid to get to the market”. Janet, Kiambu

Finance and market linkages

One of the largest obstacles for smallholder farmers is financing. Without it, they are unable to expand the production and marketing measures required to successfully participate in markets (Poole 2017). What iShamba farmers say they need is advice and direction on how to get funding from organizations that won't exploit them. They also requested that iShamba helped to actually provide loans or help facilitate informal loaning circles between the farmers.

“Our hands our tried because of the funds”. Janet, Kiambu

“The attitude that agriculture is for rejects, for the less educated, for the old – it needs to stop. It can be money making. iShamba needs to help us move to the next level – where we have other inputs from other companies”. Isaac, Nakuru

Perhaps unsurprisingly, another area in which iShamba farmers struggle is market linkages, which they hoped iShamba could help them with in the future.

Changing attitudes

One of the concerns that kept arising from these farmers was regarding attitudes towards farming and how vital it is that the younger generation build livelihoods in the agricultural sector. They would like to see iShamba helping to change attitudes about farming being for the old and uneducated and inspire the young by promoting it as a professional, profit making way of life.

“I remember when President Moi was retiring. He was given a wheelbarrow and some gumboots - indicating that agriculture is a retirement job. But I am 35 and I would like to go into farming full time but my main challenge is water”. Anne, Nakuru

Other recommendations, include:

- Opportunities to network with other iShamba farmers
- Face to face customer service e.g. farm visits
- Improvement in weather forecast accuracy
- More diversity in the products/inputs they recommend – some are hard to find
- Call Centre quicker response time e.g. sometimes you have to wait for an agronomic expert to call you back
- More extensive marketing
- Reduce cost of iShamba to make it more accessible.

“ If it weren’t for Smart Water for Agriculture (SNV) I wouldn’t know iShamba exists. The more users the better experience for everyone as WhatsApp groups would expand”. iShamba Farmer, Machakos

6.0 CONCLUSION

6.1 Study conclusions

There is substantial evidence to suggest that iShamba does increase agricultural productivity and household income. Farmers who applied the knowledge they obtained from iShamba have been able to improve their inputs in order to gain higher yields and in turn, increase their income. iShamba has helped some farmers to progress from purely subsistence farming to participating in markets. Bargaining power has also been improved through the provision of market price information – ensuring farmers can get a ‘good’ price for their produce. Farmers have also improved their ROI by receiving information from iShamba on how to reduce their costs – for example using manure for fertilizer. iShamba has also removed the time and cost of searching for information.

There is also substantial evidence of iShamba having a broader impact, beyond that of productivity and income, on the lives of these smallholders. These indirect impacts of iShamba are helping with livelihood building, resource management and school fees.

iShamba has helped them to mitigate against the loss of crops and livestock. Agronomic experts and other iShamba farmers have been a source of vital information in the event of pest attacks or drought. Through the application of this vital information, iShamba farmers have been able to mitigate risk by implementing water management systems and control diseases of both livestock and crops. Such losses can be hugely detrimental to smallholders.

Information from iShamba on how to diversify has increased the income of some farmers and also bolstered their risk avoidance strategies. Even though some iShamba farmers have experienced challenges when setting up new ventures through continued communication with iShamba, they have been able to see some gains even if they aren’t yet financial.

Some farmers spoke about a change in attitude towards farming and now think of it as a profession. Through the information they have gained from iShamba they now keep records on their crops and livestock in order to track changes and improvements. A rise in income and production is of course encouraging and helps them view farming as a business.

Interestingly, those who have lost money through the application of information supplied by iShamba, still hold the service in high regard and believe that the issue is not with the information itself but the transfer of that information to farm labour, along with their own failure in ensuring that the information has been applied.

As with most M-services, iShamba only has the capacity to act as a complimentary agricultural information service and is not in a position to tackle larger issues such as financing and market linkages. Interestingly, most of these farmers have come to rely on iShamba as the main source of information for their farming activities and yet the services it provides are not holistic. This

further supports the notion that there is an inadequate supply of agricultural extension services available to smallholders in Kenya.

Far more needs to be done to help smallholders in Kenya improve further. Smallholders need a holistic approach to agriculture in order to thrive – an approach that increases yields, enables connections to flourishing markets and protects the environment (Farm Africa 2019). iShamba can help in addressing some of these challenges and can be viewed as a valid contributor to a broader solution – requiring a multitude of service providers e.g. NGOs, Governments or private companies (Baumüller 2016).

6.2 Opportunities for further research

This study has shown that when farmers have applied the information they have obtained from iShamba the results can be positive with regards to increases in yield and income. These farmers are a heterogeneous group with varying levels of education, income and land size. However it is important to note that they are not the poorest farmers in Kenya. They are literate, with the majority receiving a secondary school education. It would be interesting to conduct further research into if farmers with little to no education could also benefit from iShamba.

It would be interesting to explore if the complexity of the advice being given by iShamba reduces the actual implementation of that knowledge, which appeared to be the case with T&V studies, whereby the more complex the practice, the lower the levels of awareness was evident (Bindlish and Evenson, 1997).

Nearly all farmers in this study shared the information they have received from iShamba. The sharing of information has been met with mixed response, with some farmers having reported success stories, while others say they share but the information is not applied. It would be interesting to carry out further research regarding the multiplier effect of iShamba.

“I do share with friends and family especially on weather but one thing I have realised that our people are not very accepting of the weather forecasts. The last dry season – I shared information with some people but they went ahead and planted anyway. Many had to re-plant or fill in, which results 50/50 on yield”. Bon, Kakamega

“I have passed information on to mainly family members. My sister in Nakuru keeps chickens and my brother in Nanyeru keeps sheep and cows”. They have since reported that they have now joined iShamba and are getting good advice. **“My brother’s cows were dying because they did not know how to feed or give medicine or even building the cow sheds. But now he is very happy because the cows aren’t sick anymore”.** Janet, Kiambu

“I share information with my community Whatsapp group (5 people) who can’t afford to sign up themselves”. Caro, Machakos

6.3 Study limitations

Due to time and resource constraints, this study consists of a small, self-selecting sample and is not deemed representative of the wider iShamba premium member population – the results can therefore not be generalised.

iShamba was derived from the TV show Shamba Shape Up, so it is important to note that some of the benefits could be attributed to this, along with other agricultural extension services.

To gain conclusive evidence on increased incomes and yields – more quantification is required, along with baseline data. All information obtained in this research was by recall. Further quantification on the actual implementation of knowledge, technology adoption, productivity and income would enable more conclusive results.

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ANNEX A: FGD MODERATOR GUIDE

Introduction and house keeping [10 minutes]

Hi, my name is Kevin, I work for iShamba and will be moderating today's focus group discussion.

We are all here to learn more about how you use the iShamba premium service and how iShamba has helped you with your farm and livelihoods.

We really appreciate all your honest feedback and insights; there is no right or wrong answer to the questions being asked. We just want to hear your stories and experiences.

Introduce others in the group

Emma is also joining me today and she is conducting this research as part of her Masters programme. She will be taking notes and assisting me with moderating the discussion.

Recording

We would like to take an audio recording today. This is purely to ensure that we capture your thoughts and opinions accurately and I can assure you that this recording will never be used publicly. All data collected will be treated confidentially.

Time

We'll spend the next 3 hours learning about your experiences with iShamba as a group. We will ask a series of questions, so please feel free to speak up whenever you feel you want to contribute but please do not talk over others, as we want to hear and record all opinions accurately.

Note we will break for tea half way through e.g. in 1.5 hours time and once the discussion has finished we will have lunch.

If you haven't done so already, please write your first name clearly on the card in front of you and complete both the information form and consent form you have been given.

Before we begin, does anyone have any questions?

Warm up

I'd like to go around the room quickly now and ask you each to tell us your name and what crops you grow and livestock you keep.

QUESTIONS SECTION 1 [1hr 15 minutes]

1) How do you use iShamba?

2) Which part of iShamba do you find most helpful?

3) Has iShamba helped you and your farm? (Y/N response)

4) Why do you think iShamba has helped you?

e.g. What changes did you make?

5) What new things from iShamba have you adopted?

6) Are you earning more money now than you used to?

➤ *Are you spending more on inputs though? If so, what kind of things?*

Tea Break [15 minutes]

QUESTIONS SECTION 2 [1hr 15 minutes]

7) How are you using the additional income?

**8) Are there any other agricultural extension/information services that you are using?
Are they free?**

9) Which one has helped you the most?

10) How do they compare to iShamba?

11) Could iShamba be improved in anyway?

12) Did you share iShamba information with friends/family who don't have iShamba?

End/Conclusion [10 minutes]

As this session comes to a close, I would like to go round the room quickly and ask you all for one key take away from today's discussion e.g. something you have found particularly interesting.

Thank you all so much for your time and participation today. We will now write up and analyse the data and for those of you who have requested to see the final report, we will send it to you by the end of September via the email address you have noted on the personal details form.

ANNEX B: PERSONAL DETAILS FORM

Name:

Age:

Address:

Email address:

Gender:

Tribe:

Are you aware that you're a iShamba **PREMIUM** member? Yes [] No []

Date you became an iShamba premium member:

Crops grown:

Livestock kept:

Land size in acres:

Income bracket (per month):

0-10,000Ksh [] 10,000-30,000Ksh [] 30,000-50,000Ksh []
50,000-100,000 [] 100,000 + []

Income streams e.g. farming, teaching, business (non farm):

Education level – primary [] secondary [] diploma [] degree, masters []

Does your household have electricity: Yes [] No []

Assets: Do you own any of the following: radio [] tv [] smart phone [] bike []
motorbike [] refrigerator [] car []

ANNEX C: SIGNED STUDENT DECLARATION FORM



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Centre for Development,
Environment and Policy



SOAS
University of London

P541 DISSERTATION – DECLARATION FORM

I have read the information about plagiarism in the *Academic Guidelines for Dissertations* (Annex B) and I understand what it means. I hereby certify that the dissertation is entirely my own work, except where indicated.

I hereby declare that the work embodied in this dissertation is original work undertaken by myself, and that it has not been submitted, either in the same or different forms, to this or any other university for a degree.

I also declare that this dissertation does not draw from any other work prepared under consultancy or other professional undertaking, by myself or jointly with other authors in any way other than that duly and explicitly acknowledged herewith*.

I agree to this dissertation being made available to other distance learning students via CeDEP's virtual learning environment.

Emma Luisa Etchells _____

Signature

16 September _____

Date:

Name: EMMA LUISA ETCHELLS (in block capitals)

Dissertation word count: 9834

(including: quotations, footnotes, titles, abstracts, summaries, tables of contents, text boxes and tables in Word containing primarily text.)

Excluded elements word count:

(references, the bibliography (if used) and appendices. Acronyms are excluded from the word count if they are contained within an appendix).

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