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Jibu: The Great Connector

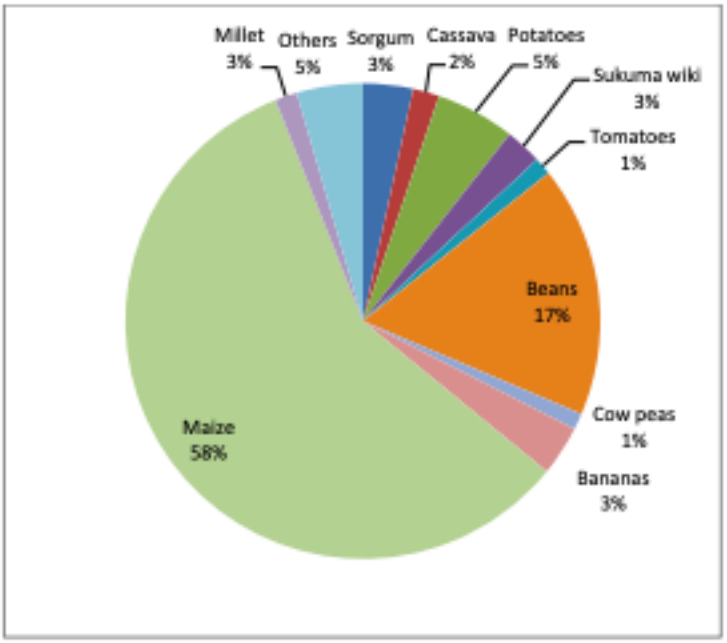
I believe that world hunger, a problem that has caused suffering to the human race for as long as we've existed, can be fixed through something as simple as an app on your cell phone. And why couldn't it be? If we can diagnose ailments and wire a house through videos on our cell phones, why not solve a nation's food crisis? Whether one is referring to a simple garden tool or the complex build of a supercomputer, technology has proven to be the driving force of human growth. It has the potential to offer billions of people in need solutions to an impending problem they may face. In fact, the indicator at any given time of an advanced society correlates with the newest gadgets at the disposal of its citizens. When technologies move forward, earlier versions of the product become increasingly inexpensive and more common amongst the population. For example, it is common to find phone users anywhere you go in the world. Furthermore, societal advances in agricultural practices and agrotechnology have allowed for farmers to feed a growing population which leads to the self-sustenance of many countries. This is not the case for all societies, however, with countries such as Ethiopia, Cameroon, and Afghanistan which have lower agricultural yields still relying on those whose crop yields are high. While many of the countries that export their crops have large reserves of fertile land, these reserves are diminishing due to malpractices in agriculture. For example, Kenya, which produces and exports an abundance of agricultural goods, has trouble with the continuous degradation of their soil. I intend to use technology to address and solve the problem of soil degradation they currently face through an application which can access agricultural extension information and deliver farmers with efficient ways in which to cultivate their land.

Kenya is a country that 49.7 million people, including my grandparents and extended family, call home. Of this population, only 30 percent live in urban communities, while 70 percent of the workforce labors in the agricultural sector (export.gov, 2017). Although agricultural exports are such a major portion of Kenya's economy with the cash crops being coffee, tea or cocoa, the average farmer is not producing these crops and is living well below their means. It was found by the Food and Agriculture Organization that "74 percent of the houses have a dirt floor, and only 13 percent have walls made with bricks. Few of them have access to electricity for lighting (about 5 percent), running water in the house (12 percent) and only 1.5 percent have proper sanitation facilities " (fao.org, 2015). The most common produce farmers will grow are maize, potatoes, and beans as their family will eat whatever they are not able to sell.

A rural Kenyan's farm is around 0.47 hectares with the average size of a smallholder Kenyan family, according to the Food and Agriculture Organization, being around seven members, out of which two are younger than 14 years of age (fao.org, 2015). In these rural households, women are tasked with the responsibility of walking long distances to gather firewood and water for their houses that lack modern appliances such as running water and electricity (culturalatlas.com, 2014). Alternatively, it is common for men to leave their rural communities to live in urban areas with better employment opportunities and send money back home to the rural areas from which they came, increasing the income for their family (culturalatlas.com, 2014). The FAO presented the fact that "an average smallholding family in Kenya generates gross income of about $2,527 per year" (fao.org, 2015). With a family size of seven people – women, men and children – this amounts to about $0.99 per day per person. With this money, the family has to find a way to meet a range of expenses such as buying food and clothes to paying for housing, education and health services (fao.org, 2015).

It is not uncommon for these small scale farmers to not have access to healthcare, clean water, and adequate education as they lack the means to attain them. This is not nearly enough money to be able to live sustainably and as a result, around 50% of smallholder farmers live at Kenya's national poverty line (fao.org, 2015). This is also the cause of such high mortality rates for the 15.9 million Kenyan smallholder farmers. Kenya is ranked 19th in the world by the CIA for maternal deaths with 510 per 100,000 births and 48th for infant mortality with 36.1 deaths per 1,000 births (cia.gov, 2018). There is such a prevalence for these type of deaths because of lack of proper sanitation. The FAO stated that "safe water and sanitation play a fundamental role in improving nutritional outcomes (fao.org, 2015). Diarrhea is one of the primary causes of death among children under five years of age and is a big reason for why Kenya's infant mortality rate is so high. Lack of safe water and proper sanitation facilities lead to diarrhea, of which constant presence results in undernutrition in children and eventually death (fao.org, 2015).

Figure 2.3 Kenya: Small farm production diversification



Source: Smallholder Farmers' DataPortrait.

As for nutrition, a smallholder farmer diet primarily consists of maize. It makes up for more than half of a smallholder household production (see Figure 2.3) but is a highly water intensive crop to grow. At the bare minimum, maize takes from 15-16 inches of water in a growing season to yield crop. With the knowledge that one inch of water per hectare is about 11,000 gallons per hectare, it is possible to deduce how many gallons of water the farmer will be using on maize alone per growing season (eXtension.org). If a smallholder farmer in Kenya wanted to use 50% of his 0.47 hectares, it takes 176,000 gallons in a single growing season to produce a low yield of Maize. This is not a sustainable way to grow crops in a Sub-Saharan African climate which is known for its dryness. Rather, it would be much more suitable to use drip irrigation in these conditions. Agriculturally, it is difficult for these farmers to change not only what they farm, but the way they farm due to the deep tradition that has been instilled over generations and a lack of knowledge of how improper agricultural techniques can negatively affect the soil quality as well as them.

Agriculture dominates Kenya's economy, and factors that affect the productivity of agriculture such as drought and aridity greatly destabilize the nation. It is easy to understand the importance of the soil quality which is the livelihood of so many. When soil quality is good, crops thrive and so does the nation. In contrast to this trend, when the soil quality is bad, the country's economic growth becomes stagnant. Due to a steady increase in population over the last 50 years and more people farming the land, Kenya's soil has progressively become more arid (undp.org, 2013). Out of date agricultural practices such as excessive tillage and lack of crop rotation along with overgrazing are at the heart of the lack of moisture in the soil. Once dry, the land prematurely releases important nutrients which are critical in the growth of plants, and thus the yield of rural farmers' crops drastically decreases.

Although soil degradation plagues Kenya, this problem is completely preventable. Soil aridity can be attributed to unsustainable farming practices that rural Kenyan farmers use. Through the adoption of environmentally sustainable agrotechnology and better farming practices, Kenya's soil degradation can be mitigated if not eradicated. To accomplish this, I came up with a way to bring conventional farming techniques into the palm of the rural farmer in Kenya. I have created Jibu, which means "answer" in Swahili, to bridge the gap in farming practices between Kenya and the developed world. Jibu is an app that gives rural farmers advice on the best ways to cultivate their crop in order to decrease soil aridity and erosion and increase productivity.

The beauty of Jibu is its simplicity. All that is required to sign up for Jibu is a phone number. Those with a smartphone would experience a clean, simplistic, interface that engages without confusion and does not provide distractions such as ads. This application would also be available to those without a smartphone through Short Message Service (SMS). When using SMS, the user would type a question, send it to the given Jibu number, and an automated service would search and answer questions using information from an archived database. Through SMS there would be no interaction with the application's user interface (i.e. no video tutorials could be streamed through this process), however, the instructions would be much simpler. This modification ensures that no matter what type of phone you have, you can benefit from Jibu.

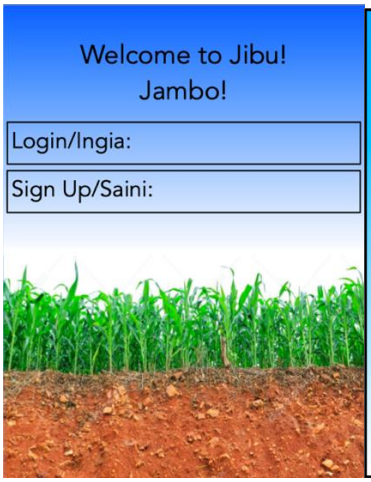
The Interface of Jibu is intentionally simple to allow anyone to use the app no matter how much or how little they know about phones. I designed this app to look like a frequently asked questions page in which you can search your own questions as well as click on questions that others have often asked. Each question is hyperlinked to either a video or an article in both English and Swahili to demonstrate processes including but not limited to:

- Setting up a drip irrigation system
- Using the correct amount of fertilizer
- Properly rotating crops throughout the year
- Integrated Pest Management (IPM)
- Properly spraying pesticides

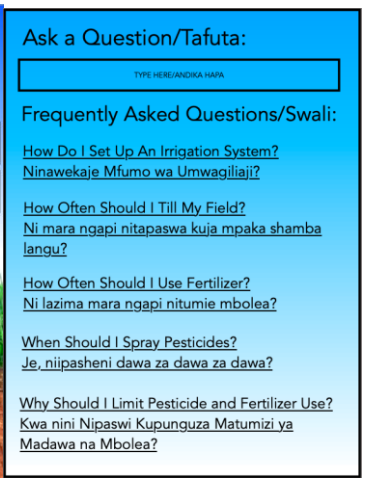
Later into this app's development, I plan to connect with other apps and organizations that share similar goals and visions as Jibu. For example, I am keen on partnering with the Bill & Melinda Gates Foundation, an organization known for its philanthropic work in Africa, as well as Hello Tractor, an app that allows farmers to rent tractors which can cultivate land significantly faster than handheld tools like a hoe. Such partnerships will be of great benefit to farmers in Kenya. Utilizing the abundant resources at the hands of organizations such as the Bill and Melinda Gates Foundation would be imperative not only help further the reach of this app but to also add credibility to it. The Bill and Melinda Gates foundation is very well known throughout Africa for doing so much for the development of African agriculture and coming up with solutions to mitigate the effects of such a dry climate.

As of 2017, the CIA reports that 42.8 million Kenyans are subscribed to a mobile cellular service (cia.gov, 2018). Furthermore, in the CIA's general assessment of Kenya's cellular network, they stated that the mobile-cellular system is generally good, especially in urban areas; [however, the] fixed-line telephone system is small and inefficient; [communication lines] are primarily microwave radio relay (cia.gov, 2018). The use of Kenya's good mobile network would be the focus of my app as fixed line telephones are not compatible with running software. With 86% of Kenyan adults owning a phone, it seems only natural to capitalize on their availability and provide farmers with a means to adopt new agricultural ideas. Through the use of my app, farmers would be better equipped to address regional challenges they face such as torrential floods, droughts, and more recently climate change at the tap of a screen or click of a button.

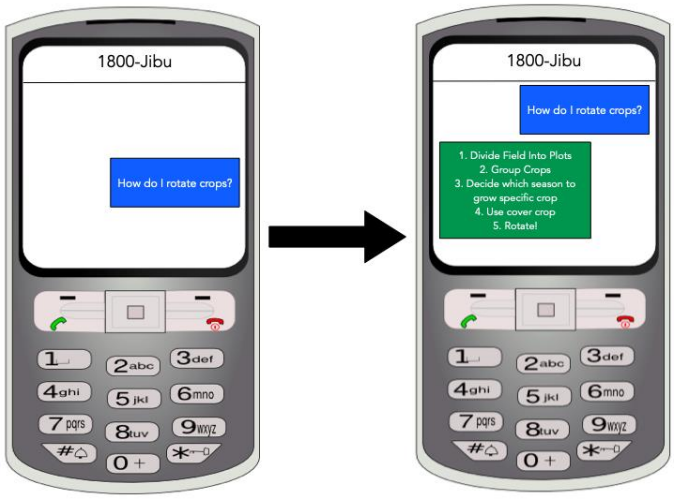
We have more knowledge at our fingers than ever before in human history. To not utilize this vast expanse of data to help humans, whether they are smallholder farmers or not, help themselves would be nothing less than criminal. Through correctly educating farmers of the importance of proper agricultural cultivation techniques, not only will important skills be passed down through generations, but so will the land they use to survive. By 2050, 9 billion humans will have to be fed on this planet. I believe that daunting task will be solved through the use of sustainable agriculture. The important thing to remember is this app is not one that teaches farmers how to farm – I believe they know how to better than anyone – rather, I made this app in order to provide farmers access to relevant information that will help increase sustainability and crop yields. While previously, farmers learned how to effectively harvest crops through trial and error, there is now no need for such repetitive and time-consuming efforts. Simply by gathering applicable information, experience, and innovations, these farmers gain the ability to viably glean their crop. With these skills Kenyan's will be sustainably fed for generation's, effectively decreasing the chance of a food crisis.



Login/Sign Up Page



Search and FAQ Page



SMS Version

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