Prototype ICT Solutions to Support Smallholder Farmers

Background

Cambodia is home to more than 16.28 million people and according to export.gov, more than 40% of the population is still working in agriculture sector,[1] with rice topping the list as the number one plantation. In addition to rice, there are a number of crops that Cambodian farmers grow on their land like cassava, corn and vegetables. There are numerous large scale projects aiming to support rice production and market in Cambodia. However, there is less support for the vegetable farmers who tend to own smaller plots of land. Thus, the project targets vegetable farmers who own small plots of land with the aim of understanding their challenges and the solutions that might help improve their economy. Based on the National Institute of Statistics on Socio-economic report in 2016,[2] 240,000 tonnes of vegetables are grown in Cambodia annually, but the supply is not enough for the market demand. The Minister of Agriculture Forestry and Fishery in one news interview stated that even though vegetable production is increasing in Cambodia, it still relies on vegetable imports from other countries. Through[3] our project(June 2018 - December 2019), a number of information discovery, prototype solutions and small pilot projects have been conducted to hopefully help farmers' economy in Cambodia through the use of technology.

(1)   https://www.export.gov/article?id=Cambodia-Agricultural-Sector
(2)   https://www.nis.gov.kh/nis/CSES/Final%20Report%20CSES%202016.pdf
(3)   https://www.khmertimeskh.com/50574977/vegetable-production-up-substantially-minister/https://www.phnompenhpost.com/business/corn-harvest-begins-northeast-amid-price-dip

Problem

During the early stage of the project, focus group meetings were conducted with a mixed diversity of farmers from smallholder to medium size farmers who grow different types of crops in their land leafy green to root crops. Unique problems were identified for each of the type of farmer and the crops they are growing. From the numerous meetings with the farmers, the common problems that the team discovered were:

The use of proper technique and chemical for their plantation
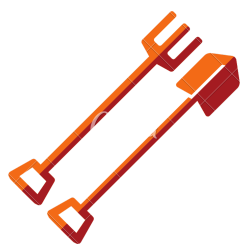
During several meetings with different groups of farmers, the team inquired if the farmers groups know about the use of the fertiliser, which their response was No adding that the knowledge they are receiving is either from peers or from the local fertiliser retailer. Plus, the majority of the fertiliser pesticide and insecticide packaging that these farmers use does not have the instructions written in Khmer making the proper practice of using the chemicals far from being correct. Since there is no regulation on the flow of chemicals and education on the proper use of fertilizer, the farmers are producing a harvest that is harmful for consumption. Not only does this have an effect on the health of consumers but also the health of the producers.

Lack of irrigation system
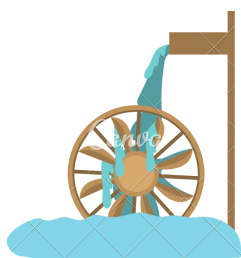
With limited access to irrigation system, plus climate change has made it difficult for farmers to predict when they can start planting their crops. The scarcity of water is one of the main reason why most crop yield is low and the harvest production is in poor quality.

Difficulty competing and connecting to the market.

With high cost in production, small volume, and low yield, it is difficult for their vegetables to compete with vegetables imported from the neighbouring countries like Vietnam . Consumers who are willing to pay higher prices are only look out for Good Agricultural Practice (GAP) or organic product, very few farmers are complied and could supply to that niche market. Non-organic farmers are left with two options; 1) sell their product in a very unstable price that fluctuates from time to time depending on the rate that was set by the middleman or 2) they can sell all the products by themselves at the wholesale market at their own risk. The frustration of limited options and access to the right market has led to unwanted results like selling with very small to no profitable margin or leaving the crops unharvested. The common pattern as a result of this may lead to farming drowning with Start Over loan in the next season.

Prototypes and Solutions

Human-centered design sits at the heart of our practice. There were numerous meetings conducted with the farmers during the early stages of the project and throughout the design and prototype solution process. During the process, as we learned about farmer's pains, the team has created a different type of quick prototypes to test out with farmers from one community to the others. During this stage, simple technology has been introduced to see the possibility of solving the issue before further tech development. However, the rapid prototype produced and field tested resulted that the solutions could not really solve this large scale, systematic problem for smallholder famers demographic. The four prototype which have been produced during the learning processed are:

Tracking income and expenses

Most farmers we talked to do not track their expense and income, specifically on how much they have spent on fertiliser, pesticide, and insecticide for the previous season. Without tracking and planning, they end up with surprise profit lost at the harvest. InSTEDD team creates a prototype mobile form that record expenses and calculation of profit lost with farmers's input of anticipated harvest sale. Somehow when tested the prototype, farmers are reluctance to change their habit.

Fertilizer Calculation

Farmers raise their concern over proper use of fertiliser for different crops to avoid over use of fertiliser and waste of money. Working with an agronomist from Royal University of Agriculture, we created a prototype that take input of soil analysis NPK, type of vegetable and then provide recommendation of fertiliser and amount to use.
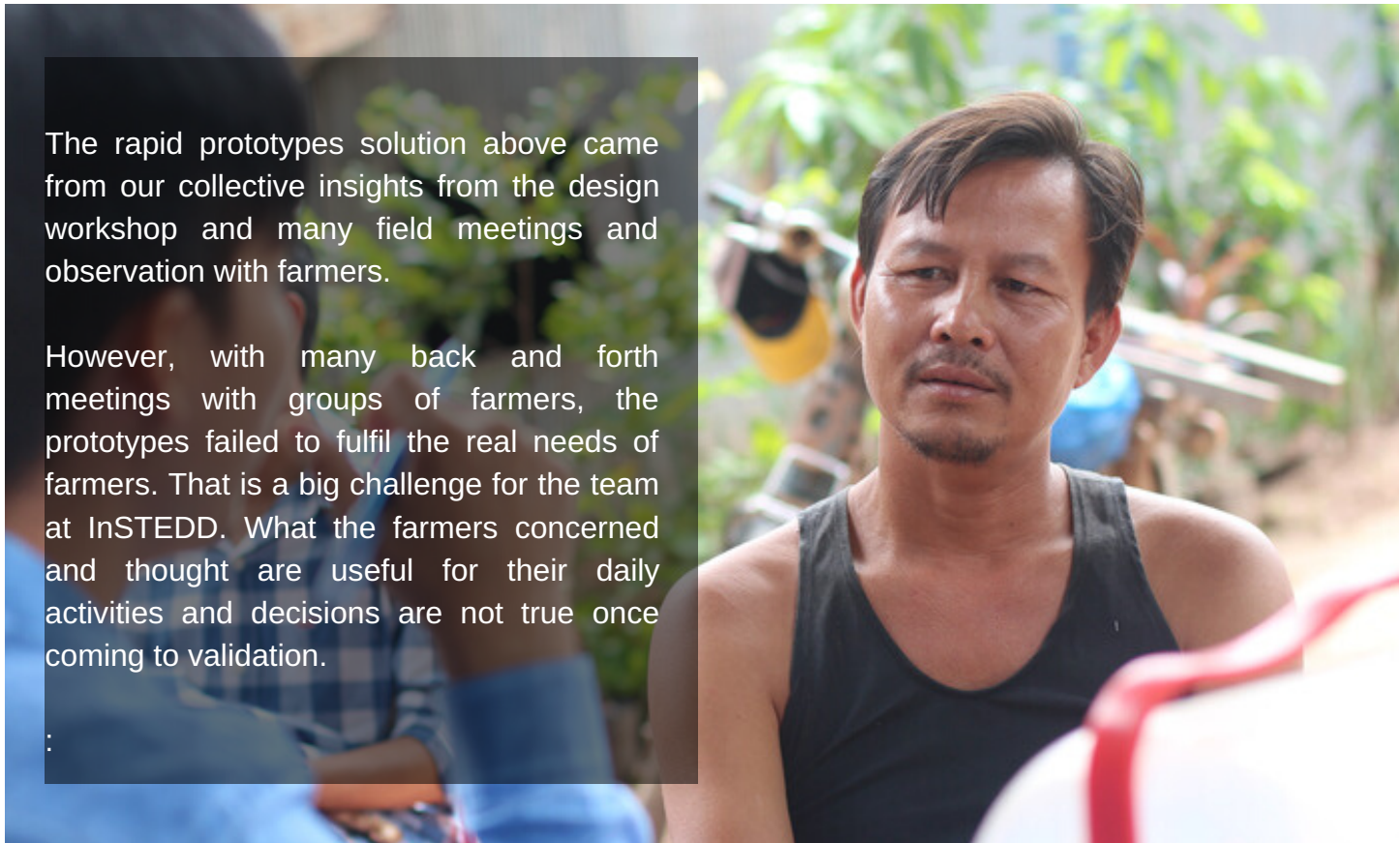
Soil Test Kit

During our design workshop with farmers and stockholders we found out that farmer never did soil testing.They are using fertiliser without the knowledge of the nutrients in their soil, what is lacking, or what/how much fertiliser they should use for their type of crop. Thus, during the third prototype, the team set out to meet with volunteer farmers and conducted soil testing with a few type of test kits along with lab testing to compare the result. Then farmers were given recommendation on fertilizer to use based on the analysis result.

Facebook chat groups

A common wish we heard from farmers is to receive technical advice from expert. InSTEDD creates two FB chat groups that link farmers in 2 communities(Teok Vil and Kroko) with the agronomist from the Royal University of Agriculture. Farmers can consult on any agricultural problems that they faced on their day to day work with the agronomist. We observed that the agronomist was active in sharing and responding but farmers was not very engage.

Challenges

The rapid prototypes solution above came from our collective insights from the design workshop and many field meetings and observation with farmers.

However, with many back and forth meetings with groups of farmers, the prototypes failed to fulfil the real needs of farmers. That is a big challenge for the team at InSTEDD. What the farmers concerned and thought are useful for their daily activities and decisions are not true once coming to validation.

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Through our prototyping conducted, one striking similarity that can be drawn out of the discussion with farmers in Kampong Cham, Kandal, and Kratie provinces is that the next generation of small holder-farmers will shrink or could disappear since most of the farmers' children now have a better education or doing other job that could earn better and less hardwork. At the same time, there are growing number of industrial agriculture or other premium niche market products. We talked to expert and looked into available online data to try to have better picture of the linkage of the agriculture supply chain, somehow there is not much data and linkage. With these new insights led us to explore further more with our prototyping.

Agriculture SME Linkage

Through the discussion with both farmers and agriculture organizations, the common knowledge pattern that can be drawn out of the discussion was that there are little public agriculture data that can be used to link to understand the market supply and demand. In addition there is no alignment or interlink of data between government and non-government institutions. That finding leads us to prototyping Agriculture SMS Linkage platform. The goal is to map data from farmers to agri-SME-processors and market demand. We use an existing open source platform to prototype this solution. We are working in close collaboration with both ministries and NGOs to collect and map existing available data. This is our continue journey beyond this current project.

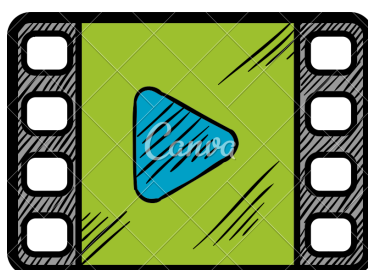## Farmer Storytelling Communities Facebook Page

With the realisation of shrinking in smallholder farmer population in the future, documentation is very important to capture the inspiration and life of our farmers for the future generation either for research purposes or being able to connect to the past. Furthermore, besides functioning as the documentation center, this page also plays a role as a platform for farmers to be able to promote their product from showing off their journey, how they made the decision and what type of products available and supply output. To be able to make people easily connected to farmers, their contact is put at the end of every profile. This is the first proven test that the team will be learning at the end of the project whether or not this will have an impact through farmers' business.

Storytelling Course

Instead of trying to gather story from farmer by ourself, we decided to teach storytelling course to youth in the community so that youth can interview farmers in their community and create story to share. That way the story is authentic, youth learn new skill and more importantly linking youth to understand more about their community and agriculture. We did so, in collaboration with KAPE. We taught to a group of students in Kampong Cham province and a group of teachers at Preah Sisowat High School in Phnom Penh with the total number of 37 participants (24 students and 23 teachers). The first batch of students produced stories on farmers located close to their area. The stories are published in the Agriculture Tales page.

The course later is developed into on digital storytelling which joined by students in Kampong Cham accounted for 30 students and another 10+ people in Kompot province. The students have produced videos related to agriculture and they were posted on Agriculture Tales page.

23 Teachers

50+ Students& Youths

4 Videos

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