Turning farmer information services into a sustainable business

IDH Learning Launch Pad
White Paper

October 2019

IDH
the sustainable
trade initiative

Contents

Executive Summary

IDH, The Sustainable Trade Initiative conducted a six-day design sprint (the "Learning Launch Pad" joined by six interdisciplinary experts) for SpiceUp (backed by Dutch food company Verstegen Spices & Sauces).

The objective of the project was to identify opportunities to increase the yield and quality of Indonesian smallholder pepper farms, and to develop SpiceUp as a financially sustainable business. Current yields are far below their potential, which leaves farmers susceptible to the impacts of climate change and volatile markets. Also, until now the uptake for data driven agriculture advisory has been low. The design sprint focused on the capture, exchange and analysis of farming data and the spreading of Good Agricultural Practices (GAP) within the farming community.

The sprint resulted in two concepts:

- A data exchange platform based on digital tools already familiar to farmers (mainly WhatsApp and Youtube), which aims to spread GAP and track farm data in direct dialogue with participating farmers.

- A cooperative-based farming model, in which SpiceUp will train subcontracted farmers (preliminary name: "Ranger") in GAP and data logging. The Rangers then collaborate with several farmers each and receive a portion of the increased earnings from the sale of produce.

This document outlines each of the concepts, including user/stakeholder insights, strategy, key features, initial business models/cases, draft roadmaps for next steps, and documentation of some rapid prototypes.

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1 Introduction to the IDH Learning Launch Pad

Agriculture, an industry rooted in traditional practices and perceptions, is facing complex challenges. In order to keep up with the growing global demand while also producing according to sustainability standards, it needs to rapidly adopt new technologies. Yet, innovations are only moving at a slow pace. Design Thinking is an approach to rapidly generate new solutions. In the IDH Learning Launch Pad, we apply this approach to help our partners solve technology challenges in the agricultural value chain and find context specific, scalable business solutions.

For each Learning Launch Pad, IDH selects a business challenge and brings together six experts, specialized in technology and business development from different industries, to work together for six days creating new approaches to the existing business model and delivering a road map for implementation.

This edition of the Learning Launch Pad series features SpiceUp, a consortium developing information services to support 100.000 pepper farmers in Indonesia. The Learning Launch Pad experts are helping SpiceUp to explore their business model and optimize farm data collection.

The solutions generated in this annual 'design sprint' are shared publicly to inspire and help companies around the globe facing similar challenges in a new technology-driven era. We hope that the readers of this white paper and broader agriculture sector learn from the knowledge generated during the IDH Learning Launch Pad.

Jayadeep Akkireddy, Senior Manager
Smallholder Inclusion & Tech at IDH

1.1 About SpiceUp

SpiceUp is a consortium of Dutch and Indonesian organizations developing information services to support 100.000 pepper farmers in Indonesia to increase production, income, food security, and optimize their inputs of water, fertilizer, and pesticides. The services are targeted at two groups, including pepper farmers and business-to-business (B2B) clients. The work covers the regions of Lampung, Bangka Belitung and Kalimantan.

🔗 **READ MORE ABOUT SPICEUP**

Currently, SpiceUp is funded by the Dutch Space Office (NSO). This funding will end in May 2021. To continue its services to farmers after this period, SpiceUp is looking to create a financially independent business model. The two avenues Spice Up is pursuing include making pepper farming profitable and creating a data revenue model that benefits both business clients and farmers.

SpiceUp's Challenge: How can data commercialization be good for farmers?

Listen to the podcast with Jay Akkireddy from IDH and Evert-Jan Verschuren from SpiceUp where they talk you through the challenges SpiceUp is facing:
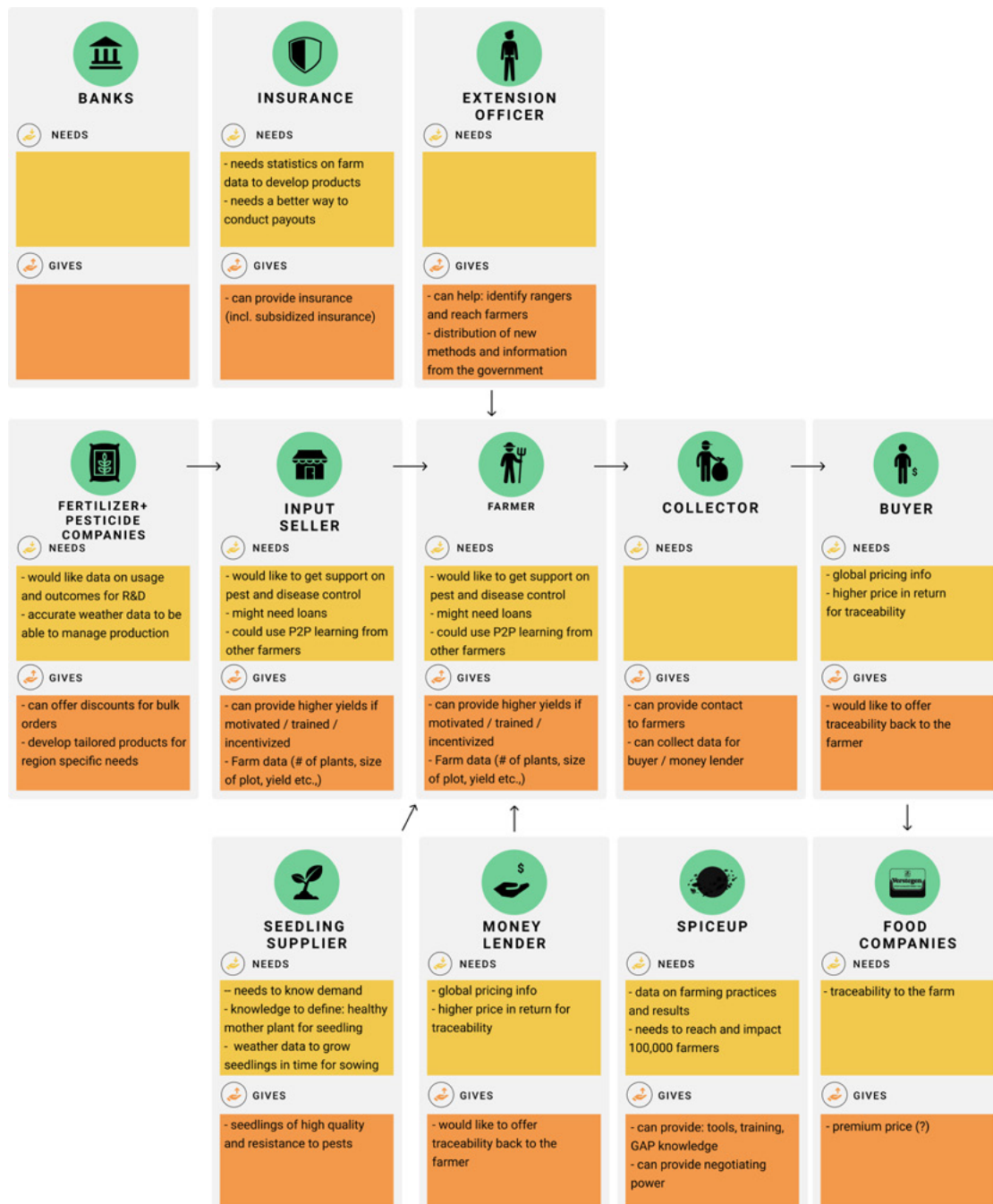
🎙 **LISTEN TO THE PODCAST**

1.2 Reality of Pepper farming in Indonesia

To understand the challenges SpiceUp is facing and the needs of farmers and their business clients, interviews were conducted. The pepper ecosystem map visualizes key stakeholders. Insights from the farmer interviews are summarized below and prioritized to uncover the most urgent challenges. The solutions developed in the Learning Lab are based on these specific insights.

Pepper Ecosystem Map

BANKS

NEEDS

GIVES

INSURANCE

NEEDS
- needs statistics on farm data to develop products
- needs a better way to conduct payouts

GIVES
- can provide insurance (incl. subsidized insurance)

EXTENSION OFFICER

NEEDS

GIVES
- can help: identify rangers and reach farmers
- distribution of new methods and information from the government

FERTILIZER+ PESTICIDE COMPANIES

NEEDS
- would like data on usage and outcomes for R&D
- accurate weather data to be able to manage production

GIVES
- can offer discounts for bulk orders
- develop tailored products for region specific needs

INPUT SELLER

NEEDS
- would like to get support on pest and disease control
- might need loans
- could use P2P learning from other farmers

GIVES
- can provide higher yields if motivated / trained / incentivized
- Farm data (# of plants, size of plot, yield etc.,)

FARMER

NEEDS
- would like to get support on pest and disease control
- might need loans
- could use P2P learning from other farmers

GIVES
- can provide higher yields if motivated / trained / incentivized
- Farm data (# of plants, size of plot, yield etc.,)

COLLECTOR

NEEDS

GIVES
- can provide contact to farmers
- can collect data for buyer / money lender

BUYER

NEEDS
- global pricing info
- higher price in return for traceability

GIVES
- would like to offer traceability back to the farmer

SEEDLING SUPPLIER

NEEDS
-- needs to know demand
- knowledge to define: healthy mother plant for seedling
- weather data to grow seedlings in time for sowing

GIVES
- seedlings of high quality and resistance to pests

MONEY LENDER

NEEDS
- global pricing info
- higher price in return for traceability

GIVES
- would like to offer traceability back to the farmer

SPICEUP

NEEDS
- data on farming practices and results
- needs to reach and impact 100,000 farmers

GIVES
- can provide: tools, training, GAP knowledge
- can provide negotiating power

FOOD COMPANIES

NEEDS
- traceability to the farm

GIVES
- premium price (?)

The current farm situation

Pepper production, as it is now, is not financially sustainable. A smallholder pepper farm is typically about 1-2 hectares and produces an average of 500-1000 kilos of pepper per hectare per year. Farmers could improve their productivity significantly through better farm management and quality, but the current low pepper prices are discouraging investment in peppers. In addition, disease accounts for 10-15 percent of all plants being lost each year.

Key insights from the field research

> While updated Good Agricultural Practises (GAP) that result in higher yields and increased quality and resilience are being developed relatively swiftly, this **knowledge is not spreading to farmers quickly enough.**

> **Farmers have limited resources** and are uninterested in making investments in their farms (seedlings, fertilizers, irrigation systems). They are in constant need of cash for livelihood activities, and are often unable to properly store their pepper to wait for a better price.

> Farmers are often **unprepared to take a loan for their pepper farm**. Reasons include: Unwillingness to take loans because of cultural or religion reasons (Islam), or not seeing the benefits of investing in pepper production due to limited returns.

> Pests and diseases claim about 30 percent of the cultivated plants within the first 3 years, and **about 55 percent of pepper plants die within 5 or 6 years**.

> Under current conditions, the cycle of a pepper plant is about 6 or 7 years (3 years to maturity and then 3-4 years of productivity). **By applying Good Agricultural Practises and Good Planting material this life cycle can increase** to 10 years per plant.

> Farmers generally indicate they have little knowledge of **farming and farm administration**, including record keeping (financial).

> Little data is captured about farm activities with few farmers keeping any record of their farming activity.

> **The various stakeholders are not well connected**. Information or knowledge is not shared and there is little interaction.

> **Local connections are very important**, advice from neighbors or village leaders – and even produce buyers – is highly trusted. Often farmers buy their inputs from local shops and sell their produce to local shops as well.

> 79 percent of farmers have **access to a smartphone with an internet connection**. WhatsApp and WhatsApp groups are a key communication channel. Some farmers use apps (such as a governmental app) or Google and YouTube to access information about pepper prices, GAPs or other topics.

> Though many farmers indicated that **pepper farming is a part time job**, they indicate that it is ingrained in the **culture** of Bangka. The **roles of men and women** are divided. Men generally make most of the decisions at the farm and do a lot of the heavy work: planting and placing support poles, working with pesticides and other inputs. Women tend to participate in harvesting and organizing day labourers to work on the farm when needed.

Based on these insights the Launch Pad developed two solutions.

1.3 Overview of solutions

Concept A

The Ranger Business Model

As a result of the design sprint, the group is proposing a new business model for SpiceUp, addressing the need to spread knowledge about GAP more quickly within the farming community and benefiting from economies of scale within an inherently small and fragmented industry. This model is preliminarily called the 'Ranger model': a group of farmers is trained as experts in pepper production, increasing quality and yield using information, inputs and advice from SpiceUp. These 'Rangers' will then act as multipliers of knowledge and agents of change for a broader group of farmers, helping them with planning, farming activities, tracking record, providing inputs etc. Farmers will remunerate the 'Rangers' for their services with a portion of their production.

🔗 **GO TO THE RANGER BUSINESS MODEL**

Concept B

The Data Exchange Platform

The data exchange platform addresses the explicit need for more farmer training to encourage adoption of GAPs and regular record keeping. Farmers utilise an app to access GAP training videos, and enter data, including an offline data collection system in the form of a printed calendar with QR-code technology. To motivate them to collect and share data, a reward system of discounts is integrated into the app. SpiceUp can offer these discounts based on their aggregated negotiating power with e.g. input providers. The data captured can be of interest to other stakeholders in the value chain, who are looking for accurate field data and direct access to farmers.

🔗 **GO TO THE DATA EXCHANGE PLATFORM**

1.4 Generated ideas

Many potential ideas were created during creative brainstorm sessions. Ideas that best fit the context were selected for further development. Below is an overview of some of the ideas generated early-on in the process.

Communicate GAP to farmers and ensure uptake, so farmers become more productive and profitable.

- A Certified SpiceUp Master trainer program.

- A text based BOT - layers of coaching you learn percentage of courses and master skills (DuoLingo for farmers).

- Video tutorials on GAP for farmers.

- A competitive/cooperative gamification platform

- Farmer awards based on skills and competition. Winners receive a prize (money/input) and become trainer for a workshop.

- Use influencers in the community to promote GAP.

Define the business model and identify who will pay for what.

- The farmer initially pays for his training, once he sells his pepper the money for the training is returned.

- Train the farmers on financial administration.

- Utilise a QR-code on the end-product so end consumers can make a direct donation to the farmer that produced the pepper.

- SpiceUp becomes the intermediary between input suppliers and farmers, buying inputs in bulk with a discount and offering to the farmers for a fair price.

Facilitate record keeping and make it attractive for farmers.

- Utilise QR code let end consumers pay fee to farmers.

- Crop calendar that gives an overview of activities to be done.

- FarmVille for Farmers - system, network or game, connected to the real crops to share data in a game environment and connect with other farmers.

- Chat bot with predefined answers.

- Celebrating best practises - farmer of the month - 'leader of the farmers'

- A log book where farmers practise filling out the log books. Learn how to track records.

Make farmers become more financially literate and make financial planning easy.

- Share stories of financially successful farmers as training.

- SpiceUp hires farmers as day laborers on model plot & trains them in the process.

- Use local data (weather, soil, rainfall) to make financial predictions.

- Create a crowd investment platform for farmers

- Collaborate with banks: open an account, attend training to earn points. Points translate into becoming an ambassador to your community.

- A community savings app (savings + community support benefits) - peer pressure ensures regular savings.

- Earn loyalty points and multiply them by tending to them well (can be exchanged for discounts)

- Create a game (like SimCity) to earn and share points (loyalty points)

2 Human Centered Design Approach

Human-Centered Design or 'Design Thinking' is an approach to innovation that uses tools from the design world, like user research, rapid prototyping and user testing. It's a proven approach that puts the user's needs at the center, creating effective solutions in a short timeframe.

This approach fits particularly well with SpiceUp's challenge, where an interdisciplinary team of experts (of which only a few have previous expertise in pepper farming), need to quickly understand what will add value for pepper farmers and other stakeholders within the ecosystem and then contribute to a solution leveraging their individual strengths.

How it works

The approach consists of two alternating phases. The first phase is a dedicated time to generate inspiring and creative ideas. This is strictly separated from the other phases, which emphasize idea selection and decision-making. This allows teams to unlock their creative potential in a structured way, making concepts tangible early in the process. Prototypes are created within days and improved immediately through real life user testing. This ethos of "failing early to succeed sooner" makes design thinking effective in tackling complex challenges that require non-obvious, systemic solutions.

Watch the video by Daylight Design to learn more.

HIGHLIGHTS OF THE LEARNING LAUNCH PAD

THE HUMAN CENTERED DESIGN APPROACH

2.1 Experts

The six experts were carefully selected from IDH's network to solve SpiceUp's challenge. Their knowledge and expertise were the foundation for the generated solutions. Get to know them by reading their biographies.

Nzau Muinde	**Nienke Bernard**	**Koen Verberne**	**Bernadette Farias Loscio**	**Ananth Gudipati**	**Antoni Hauptmann**
Finance & data analytics expert from Mastercard	Independent data privacy expert	Geodata & business development expert from 52impact	Data Ecosystem expert from Federal University of Pernambuco	Digital & business development expert from World Food Programme	Blockchain technology expert from OURZ AG

BIOGRAPHIES OF THE EXPERTS

Challenge owner:
Evert-Jan Verschuren
SpiceUp

Organized by:
Jayadeep Akkireddy & Imme Ruarus
IDH, The Sustainable Trade Initiative

Facilitated by:
Pascal Soboll & Siddharth Dasari
Daylight Design

We would kindly like to thank the farmers and representatives of the following organizations for their participation in the Learning Launch Pad: Dinas Pertanian Provinsi Babel, Seedling Seller, Universitas Bangka Belitung (UBB), BPTB Babel, Koperasi Lada Babel, Biro Perekonomian Babel, Bappeda Provinsi Babel, Direktorat Jendral Perkebunan, Balittro, Pupuk Kaltim, Hara, Rabobank Foundation, and iGrow.

Big picture – a glance into the digital ecosystem and business sustainability

High penetration of mobile phone and data among the rural populace has given rise to multiple and scalable business models. Digital technologies in the agricultural "last mile" can benefit all stakeholders involved in the production and trade of crops. Crop buyers find new efficiencies when sourcing from smallholder farmers directly. They also benefit from enhanced traceability of the product, enabling them to command premium prices, as well as from real-time visibility in the supply chain, which enables operations to be monitored and predicted more efficiently. Meanwhile, producers benefit from more transparent transactions and better access to markets, which allow them to sell their produce at competitive prices and improve their livelihoods. Crucially, the digital footprints these tools generate can help develop economic identities for smallholders.

Digital identities provide banks and other financial institutions with a range of relevant data points to assess a farmer's credit risk and ability to repay loans.

Indonesia has been a hotbed for technology innovation in the recent years. With large start-up firms like Go-jek and GRAB expanding their services and making inroads deep into rural networks, the timing is ripe for AgTech innovations to take off in the country. A growing number of Indonesian start-ups are currently developing solutions to optimize the value chain by addressing pain points faced by both producers and buyers. While many of these interventions are much needed within the agriculture sector, the jury is still out on whether they will be sustainable and create impact at scale.

Data Protection and Governance

With the rise of AgTech in Indonesia, an increasing amount of agriculture-related data has become available in digital form. Data points such as farm and farmer records, as well as transactional data from the procurement of crops, are proving useful to value chain actors allowing for visibility in the last mile or to ensure traceability and certification of crops. These data points are also becoming valuable for stakeholders on the fringes of the agricultural sector, such as financial service providers targeting the rural segment. Crucially, digital data can help farmers to establish a functional economic identity.

However, data ownership remains a significant issue, as is sufficiently incentivizing farmers and other institutional actors that collect and own farm and farmer data to share this it. Farm and farmer data represent a key asset for agribusinesses and appropriate governance and institutional mechanisms must inform data sharing among stakeholders.

Financial Viability

Another challenge of many AgTech firms is the financial viability in the medium- to long-term. While good data is needed across the value chains, it is all-too-often not immediately monetized. For example, many AgTech firms focused on providing information services to smallholder farmers, and looking to earn revenues for this service have had limited success. While there can be many factors such ability to pay, lack of payment methods to reach 'informally banked' environments existing at the last mile, it has forced the startups to look for other revenue sources, while leveraging data points.

Many AgTech firms have since pivoted their models away from data sharing on to other models, such as providing actionable insights to larger firms about their customers, precision agriculture services for farmers, developing innovative marketplaces to enable access to services and transactions for smallholder farmers, etc. Additionally, these firms have also started to innovate around credit scoring algorithms and yield forecasting for better insights into small-scale farming. The AgTech innovation within SpiceUp will also have to constantly look into these pivot models to identify different revenue sources, while ensuring that the key points around farmer impact are met.

4 From challenges to solutions

Two key solutions were proposed based on the challenges faced by SpiceUp:

❯ **The Ranger Business Model** - to make pepper farming a financially sustainable business

❯ **Data Exchange Platform** – to provide training and collect data

4.1 The Ranger Business Model

Current Situation/Need

Currently, pepper farmland resources are highly underutilised. Though research into best practises is evolving every year, there are few effective communication channels in place to disseminate the information quickly, leading to a lack of pepper farming know-how among farmers. Culturally ingrained practises need to evolve, especially due to the increasing effects of climate change, but they often don't adapt. An example of this is the typical approach of farming without irrigation, which prevents yields from reaching globally competitive levels.

In addition, farmers have all admitted to a lack of knowledge on pest prevention and treatment. As farmers typically do not keep track of their investments or their farms' output, they don't tend to have business knowledge to fall back on, which would allow for better decision making. For example, none of the farmers we spoke to invested in fertilizer appropriately, but rather purchased whatever quantity and quality of fertilizer their current cash flow would allow for, often leaving them with too little and/or the wrong kind of inputs.

The situation described above results in a yield that is much lower than theoretically possible, often only 25-50 percent of what it could be per hectare. Given those factors, pepper farming has degraded from an economically sound activity to something pursued for its cultural significance without effectively contributing to the livelihoods of farmers. With low market prices for pepper, farmers' attention has further diverted to other activities, which leaves their farms vulnerable to pests and failing crops and further limits their interest in learning about GAP.

On the other hand, the global demand for high quality pepper is growing. If a business model is developed that leads to an increase in productivity and a rise in quality, it has the potential to unlock a significant increase in revenues and profits for farmers and businesses alike.

Key insights

The yield per hectare could more than double – potentially even quadruple – for each hectare.

Individual farmers' plots are too small to make it worth their time to learn about GAP and track their farms quantitatively. For a typical pepper farm of about 1 hectare, farmers say they spend about 2-3 hours per day on pepper farming.

GAP knowledge, for example prevention and treatment of pests or irrigation, does exist at research centers (e.g. PT CAN's model farm), but it typically does not reach farmers.

Quantitative data about farming activities and the performance of individual farms (and the traceability that would come with it) could benefit all members of the pepper ecosystem: farmers, research groups, buyers, input sellers, insurances, government, etc.

Opportunity

Against the backdrop described above, we see a clear opportunity for SpiceUp/PT CAN to empower farmers to build profitable farming business and drive up yield and quality of Indonesian pepper farms.

Expert information suggests that the yield of each smallholder farm could likely be more than doubled (in some cases a fourfold increase is cited as possible), which would make it viable to not just encourage farmers to incrementally improve practises, but switch over to a subcontractor farming model. This involves a farmer renting out their farm to another, more specialized farmer who focuses solely on pepper farming across multiple farms, with farm output being shared between the subcontracted farmer (preliminary name: "Ranger") and the farm owner.

In addition, PT CAN will act as a central buyer of the crop and seller of inputs. Rangers will have the opportunity to purchase farm inputs at lower price as active members and users of SpiceUp.
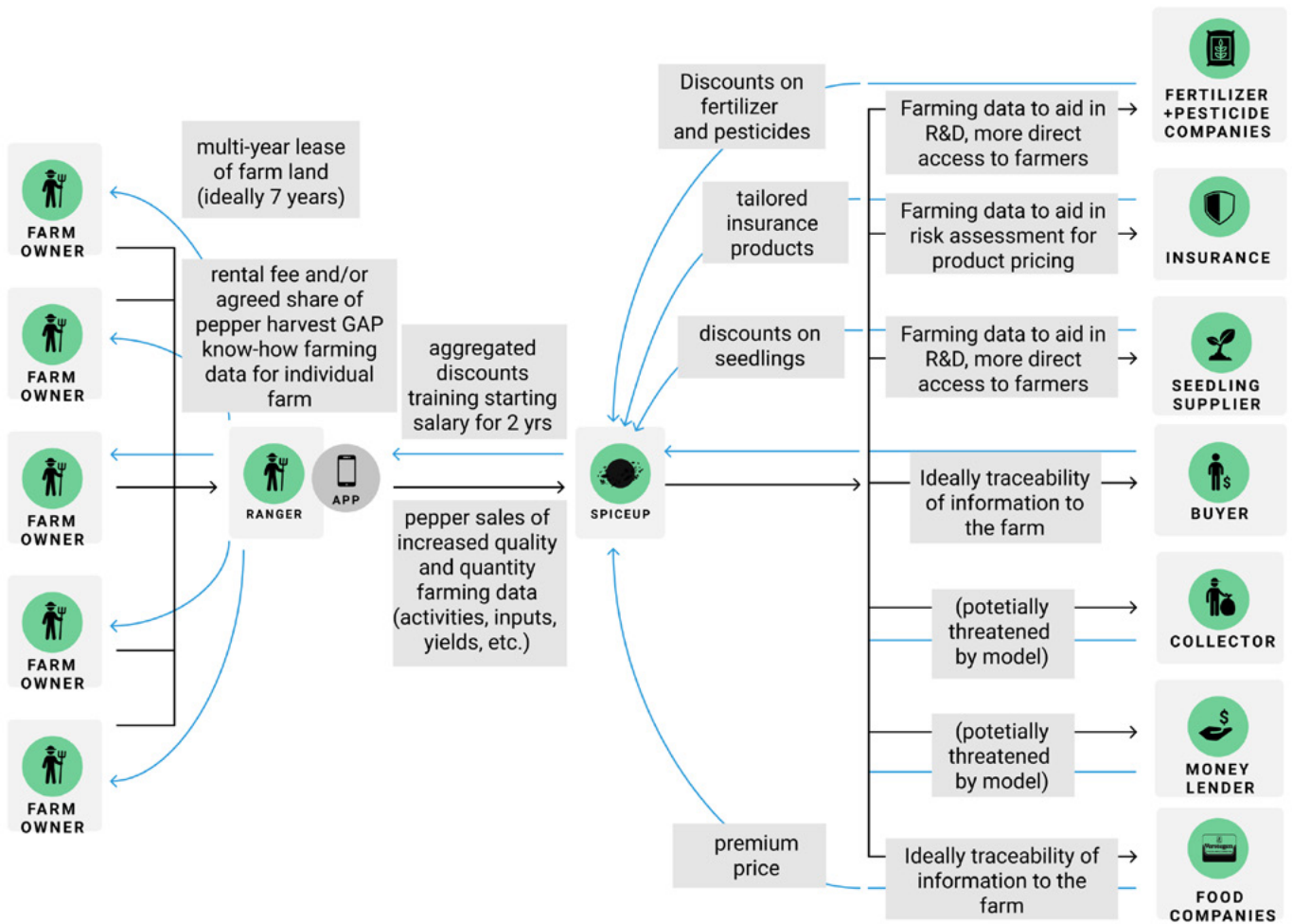
Concept

Following the Ranger concept, SpiceUp and PT Can will build up and train a network of well-trained, digitally savvy Rangers, who will act both as disseminators of GAP knowledge and as data collectors across multiple farms.

During the transition phase, during which the Ranger will be trained to bring their farms up to a higher standard of GAP and increase its output accordingly, SpiceUp would pay them a salary. We expect this time frame to be about two years. After that, the increased pepper output will result in an increase in income for the farm owner and will pay for the Ranger's livelihood, too, making the model self-sustaining in the long run.

There are three key components to the business model:

> **Improve Standards:** Provide training and sustainable farming framework

> **Scale Farming:** Onboard low performance farmers and unlock higher outputs

> **Sell Pepper & Services:** Market digital services, monetize affiliates & act as single supplier

Diagram labels:

- FARM OWNER (×6)
- multi-year lease of farm land (ideally 7 years)
- rental fee and/or agreed share of pepper harvest GAP know-how farming data for individual farm
- RANGER / APP
- aggregated discounts training starting salary for 2 yrs
- pepper sales of increased quality and quantity farming data (activities, inputs, yields, etc.)
- SPICEUP
- Discounts on fertilizer and pesticides
- tailored insurance products
- discounts on seedlings
- premium price
- Farming data to aid in R&D, more direct access to farmers → FERTILIZER +PESTICIDE COMPANIES
- Farming data to aid in risk assessment for product pricing → INSURANCE
- Farming data to aid in R&D, more direct access to farmers → SEEDLING SUPPLIER
- Ideally traceability of information to the farm → BUYER
- (potetially threatened by model) → COLLECTOR
- (potetially threatened by model) → MONEY LENDER
- Ideally traceability of information to the farm → FOOD COMPANIES

Challenges to be addressed

1 The model will be self-sustaining in the long-run, but will require seed-financing to cover the first two years during which the first group of Rangers will be trained in making the first generation of farms profitable. After that, the income generated for SpiceUp/PT CAN will make it possible to scale up the model to future generations of farmers.

2 The scaling up to higher numbers of Rangers will be limited by the income generated by previous (at first, likely very small) groups of Rangers. A quicker path to scaling would be desirable. This would need additional sources of financing, allowing SpiceUp to train and pay more Rangers sooner.

Roadmap, Business Case, Next Steps

2019 – Phase 0: Early experiments

We suggest to first run a small-scale social experiment with a group of three to five farmers, engaging them to farm communally with one of them receiving specific GAP training. Potentially channel the inputs through one farmer. Start ASAP. Learn through rapid prototyping: *What are the group dynamics of joint, cooperative-based farming? How does the division of labour pan out with a group cooperating like this? How does dissemination of GAP information best work in this set up? How can one Ranger best take care of five farms? What will need to be contractually clarified to make this model work at scale? Which tools will we need to provide to make everyone feel sufficiently involved and informed?*

2021 - Go Live

Having established all relevant details of the operating model and having built all relevant tools, SpiceUp will be ready to launch the Ranger model as a larger-scale operation, with roughly 100 Rangers entering training (pending available funding and interest of Ranger candidates and farm owners).

2020 – Phase 1: Pilot

After a few first principles have been established through previous experiments, SpiceUp will be in a position to hire the first pilot group of Rangers. We suggest a group of five to ten. Identifying suitable candidates (young, ambitious, digitally savvy farmers) and matching them up with farm owners open to this new model will be the first challenge, in addition to finding donors and investors willing to back our project.

Once this is established, the key pilot questions can be addressed: How can we train Rangers most effectively (videos or in-person sessions)? How effective are they in transforming five farms each to high yield, high quality operations? How can we motivate farm owners and Rangers to stay loyal throughout the duration of the pilot? How do we ensure accurate data capture and data sharing among stakeholders (spot checks)? How do we work with business stakeholders to unlock the value within the farming data so that they are willing provide value in return (e.g. discounts from input suppliers, premium price from buyers, etc.) Do we observe any tensions among stakeholders and if so, how do we help resolve them?

2022 - Scale

With the first group of farmer training well underway, tools and processes will be ready to scale up.

2019: Pre-phase

Focus on engaging 1 Ranger and 5 farm owners to work collaboratively on their farm.

> Understand the group dynamics, costs, finalize

> GAP and Business training module and engagement to set up the pilot model.

> **Costs: $4.500**

2020: Pilot Phase

Recruit five Rangers, 30 farms and management staff to oversee the operations.

> Engage various donors and investors for fundraising.

> Monitor activities for further strengthening and scaling up.

> **Costs: $107.000**

2021: Go Live

100 Rangers trained and 500 farmers engaged.

2022: Scale

1.000 Rangers trained and 5.000 farmers engaged.

> Continuous improvements on Ranger recruitment and training, operations, supplier arrangements and data monitoring.

> Improve benefit to all stakeholders for further evidence of scaleup

> **Costs: TBD**

Revenue Model

The "1 Ranger: 5 Farmer" model is a cooperation agreement for 7 years:	**Business plan per Ranger:**	**Finance Need:**
> The 2 year "Ramp-Up" period aims to train farmers & refine their land > The 5 years "Harvest" period will generate sales revenue	> Profit: **$18.000** > Break-Even: 3 years > ROI: 5,5 years	> **$67.000** for each Ramp Up + 20 percent discount or subsidy for seedlings and fertilizers.

Donors, investors and partners are needed to fund the Ramp-Up period and support the Harvest period by providing inputs. In the long run, SpiceUp can become a platform where Rangers get training, advice and finance for inputs to farm as a business.

4.1.1 Different financing options for SpiceUp

The SpiceUp business model will require funding to start. For this purpose, some ideas were generated to find ways in which SpiceUp the entity can obtain the funding required to ensure that the business model discussed is actualized.

The proposed ideas included:

A. Crowd funding options provided to investors
– This option would require SpiceUp to advertise to interested private investors, where they would inform the private investor based on the selected Ranger farm activity that they would obtain a range of return on investment (ROI) based on harvest purchase by the off taker/buyer when the produce is ready for purchase. E.g. A private investor would contribute X USD at planting and this contribution would be matched by other investors within the investment group. Once the total amount for a Ranger is reached, the contribution is stopped and the investors will then monitor and wait for harvest through SpiceUp's app that will provide regular updates on Ranger activity. On purchase by the offtaker, the investor will receive the contributed invested amount + agreed margin (X percent) immediately after produce sale completion.

B. Funding through financial institutions (FI) that would offer credit to select SpiceUp Rangers based on grant collateral provided by a donor
– This option will allow for the Ranger to take up the risk, instead of distributing the risk among others in a crowd funding situation. An FI will work with SpiceUp and through the entity to identify the Rangers they will working with. SpiceUp will provide the required credit information to the FI on behalf of the Rangers and lodge a credit application.

Once the credit application is approved, it will be disbursed to the Ranger through SpiceUp, who have the grant offer assistance provided to them by a donor willing to fund a Ranger. The Ranger will then have credit to carry out the full produce cycle and sell the produce to SpiceUp (the offtaker/buyer), who will make deductions on behalf of the FI during purchase and provide net value to the Ranger. In case of default due to, for example crop loss based on disease, the grant provided by the donor will cover the default on behalf of the SpiceUp Ranger.

C. Private loans to Rangers through financial institutions (FI) at discounted rates with a base of donor-funded collateral in case of payment default – Donors in this model can partner with an FI that is looking to provide credit to this sector. The role of the FI is to allow for Rangers to apply for credit specifically for pepper farming. This FI would then vet the Ranger based on information they have or obtain from the Ranger on application and additional information from the SpiceUp program. With this data they would make the risk-based decision to provide credit to the Ranger and have the donor agree to back up the credit of all SpiceUp Rangers if they fall into loan default. Again, in this model the Ranger will only access the credit through SpiceUp based on the different intervals

required in the business model. The loan will then be repaid back to the FI with additional fees upon sale of produce to SpiceUp and the Ranger then obtains the net off payments in their bank account.

D. Funding through agricultural securitization – This is the most complex of all the ideas we provided to SpiceUp. Securitization is an operation through homogenous illiquid financial assets (the pepper produced) are pooled and transformed into marketable securities for investors. In a securitization transaction, the securitized assets (the pepper) is transferred by the originator (the FI with the loan extending portfolio based on the loan issued to SpiceUp for its Rangers) to a special purpose vehicle (SPV, i.e. the Investors) as the asset purchaser. The reason we use the SPV is because holding the assets in a bankruptcy remote vehicle like the SPV gives the investors a first ranking right to those assets. The SPV may be a corporation, trust or another type of independent legal entity, in this case it will be SpiceUp. The SPV issues securities to the investors, which are backed by the income flows generated by the securitized assets and sometimes also by the underlying assets themselves (true sale) of the pepper to them by the Rangers.

Therefore, this financing option requires SpiceUp to work with a Financial Institution (FI) to securitize the asset, in this case the pepper produce, by creating an SPV. It will also guarantee the FI that SpiceUp will buy the produce as it's marked out as the asset owner, ensuring guaranteed payment for any loan taken out to back up a Ranger by SpiceUp.[1]

The above financing options were tabled by the team working on the business model and are subject to market testing to see what best fits with SpiceUp's overall business strategy.

4.2 The Data Exchange Platform

Current Situation/Need

While there are tools available to capture farmer data, including basic demographics, farm data (area, location, etc.), and production (weight, price, quality), there are few options for that allow farmers to input data directly and potentially benefit from the use of that information.

There are two main themes to be addressed that could greatly improve farm management practices. First, limited amounts of data are collected about farm activities, such as tracking fertilizer application or the spread of diseases. The same applies to records of volumes produced, and financial information, such as profits and losses, etc. The farmers indicate that tracking this information is not perceived as important, as it takes time and they derive no clear value. What contributes further to low engagement is that there are few options to input data in an easy and structured way.

Second, farmers indicate that generally they have little knowledge of farming administration. For many farmers, pepper farming is a part-time job combined with another occupation. The farmers indicate that they lack knowledge about topics, such as GAP, pest and disease management, and water management. Currently, pests and disease claim roughly 30 percent of their pepper plants within the first 3 years. A total of 55 percent of pepper plants die within 5 or 6 years (lifetime of a pepper plant). Farmers indicate that they would be interested in improving their farming knowledge, either through in-person training or video tutorials.

Without data-driven insights, a simple-to-use framework for data input, and access to best practises, most farmers are unable to improve their production, quality and income. At the same time, SpiceUp is seeking an engaging way to interact with farmers to share valuable information with them.

Key insights

Effective engagement of farmers relies on understanding the way they consume information and how they prefer to interact. We found that nearly all farmers have access to a smartphone with a connection to the internet. WhatsApp groups are one of the preferred channels farmers use to share information on pepper prices. Other channels used to access information include a government app, Google and Youtube videos. However, not all farmers are at the same level of financial literacy.

Opportunity

Looking at the current situation, there is a clear opportunity for SpiceUp to support farmers in accessing information that could improve their farm management, as well as facilitate farm data collection.

Before the start of the Launch Pad, SpiceUp had already began the development of an app. SpiceUp found that 79 percent of farmers have access to a smartphone with internet, making an app an appropriate approach. Farmers can plan farm activities, capture data, and receive information through the app, which also allows SpiceUp to engage with the community and contribute to farmer sustainability. We propose extending the app under development to integrate several additional features for data collection.

Accurate data collection benefits every stakeholder:

> **SpiceUp** will benefit from farmer/farm profile and monitoring data to help improve decision making. Profile data can also be monetized.

> **Farmers** will benefit from advice and recommendations from experts, free GAP tutorials, easier access to finance, and tools to help establish a farming plan.

> **Financial institutions** will benefit from farmer/farm profiles and monitoring data to develop and extend financial products (loans and insurance).

> **Agri-input Supplier Companies** will benefit from farmer/farm profiles and monitoring data to create customized marketing strategies.

Concept

A simple, intuitive and engaging app will enable farmers to enter data and receive advice on the best times and methods for the sowing, harvest and sale of their crops. It will allow them to log simple farm tasks providing stakeholders with information about farm activities, current conditions, and the expected quality and quantity of crop. This will allow other stakeholders to better tailor their offers to an individual farmer's needs and also develop new products and offers. In addition, this will give farmers an opportunity to access quality, personalized content that could help them to apply best practises to increase yield and quality of their pepper. For the less tech-savvy farmer, a printed calendar with QR-code technology is proposed, bridging the online and offline world.
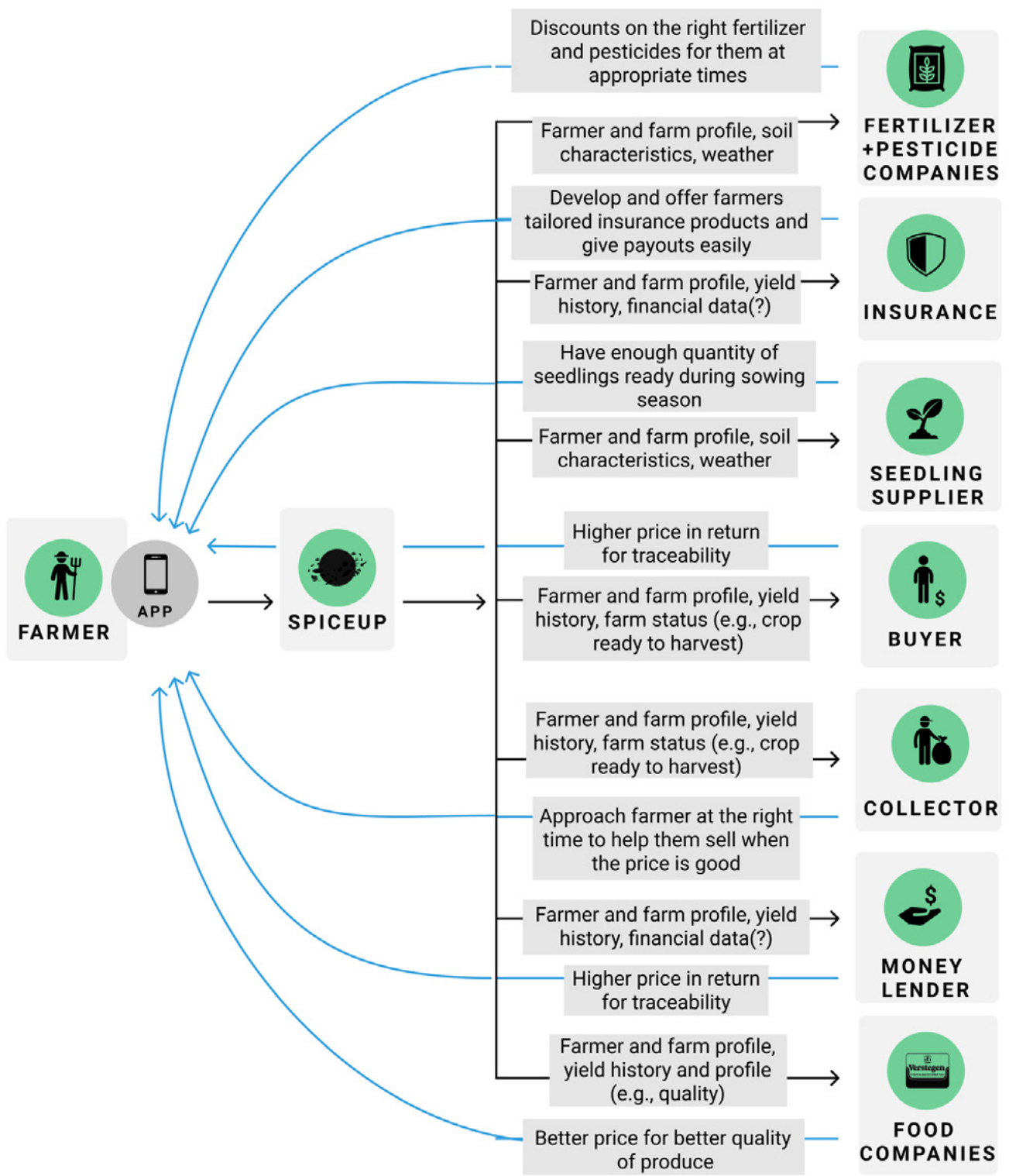
App features

4.2.1 GAP training via video

In interviews, farmers mentioned explicitly that they would like to receive training on pepper farming. Currently, there are very few training services available for farmers. In-person training is mostly provided for crops other than pepper, and information available online is not relevant for their context.

One of the most feasible options to remedy this is to create an online learning and teaching platform for pepper farmers to build their knowledge of GAP and financial services. It will help increase the productivity and resilience of pepper farmers, enable financial inclusion, and provide a vehicle to reach farmers with products and services.

Using the app, farmers will encounter short and simple tutorials that are relevant for their context. Subjects to be covered could include water management, pest & disease management and financial literacy. In a tutorial, an expert on a representative farm would explain the specific topic in a video of 3-10 minutes. Farmers could comment and upload their own questions, films, and pictures, and ask for feedback from experts and other farmers. The resulting online community will expand the opportunities to learn among pepper farmers and experts. The tutorials on the website would be embedded from YouTube meaning that they could also be accessed through a dedicated YouTube channel.

To promote the app and tutorials, WhatsApp can be used as a communication channel. This concept leverages existing farmer behaviour, as most farmers already use WhatsApp as one of their primary communication channels. Tutorials can be pushed through existing farmer WhatsApp groups. The content of the tutorials can be generated by the local university and PT CAN. The quality of the tutorials can be validated by peer-review and online feedback. Also, promotion can be conducted during demo plot days and vice versa. Furthermore, collaborations can be established with universities, such as the Wageningen University, to increase the credibility of the platform.

Business model

The best way to develop the learning platform is through a grant or subsidy. During the initial period, a sponsoring/advertisement model can be established to ensure continuation after the grant has ended. For companies, the platform provides an interesting option for advertising their farming products (e.g. fertilizers or pesticides) for two reasons:

> Direct access to a specific and relevant target group that is often difficult to reach.

> Demonstrating their support for sustainable farming to the public

Reward system

During the interviews, farmers indicated that they would like to receive tutorials to become better farmers, so it is expected that they will be intrinsically motivated to watch the tutorials. Additional incentives can be provided through a reward system. When a farmer completes a tutorial, he/she receives points. Upon acquiring enough points, these can be exchanged for a discount voucher for certain (advertised) products such as pesticides. Other potential rewards could include:

> In the short term, participation could be incentivized through free samples, free seedlings, free on-site advice, or exclusive bonus content.

> In the long term, depending on the partnerships SpiceUp develops, farmers could receive basic goods (food/toiletries/phone credits), health insurance, use of tools or machines (to rent).

Certificates of achievement can be another reward for farmers who have completed a certain number of training videos. This certificate indicates that the farmer is knowledgeable in a specific topic of farming.

4.2.2 Activity Tracker App

Data collection in the app must be simple and intuitive to use. The farmer should be able to log simple tasks quickly and efficiently.

An additional digital layer that could be embedded into the SpiceUp app currently under development would be an activity monitor/tracker for the farmer to log in details of actions in the field, e.g. whenever they apply fertilizer or pesticide, when crops have been harvested, or plants have been pruned. They could also have access to a digital version of the Crop Calendar with an overlay of training videos (see example below) providing farmers with access to immediately relevant content. One engagement incentivisation would be a 'Potential Price Graph' for their crop that would increase as they complete certain tasks that could improve crop quality.


Prototype of the app
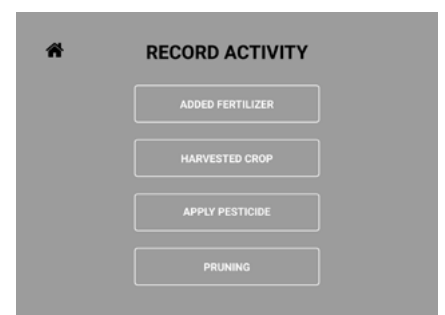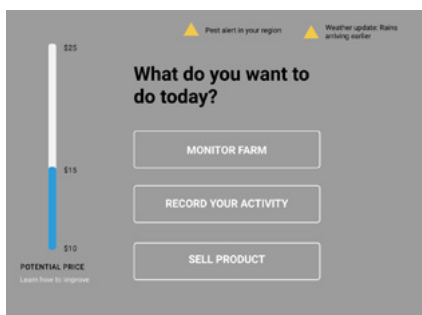
Business model

Data collected through the app is valuable to other players in the value chain as well (see Stakeholder Data Exchange Flowchart on page 20). The overview below shows an example of what the flows of services, produce, data, and finance could look like.

SpiceUp offers training and knowledge to the farmers to improve farm activities **(1)** The farmer, over time, tracks data through the app, which is received by SpiceUp **(2)** SpiceUp validates the data and shares it with other value chain players, including financial institutions, buyers, and agri-input supplier companies. **(3)** In return for the data the value chain players offer their services, such as fertilizers and loans sold to SpiceUp/the farmers at a discounted price **(4-6)** The farmer increases their production and quality, sells their pepper to SpiceUp and receives payment **(7-8)** SpiceUp sells the high quality pepper together with the traceability data to the buyer, who pays a premium price **(9-10)** based on premium quality and complete traceability. With this premium price SpiceUp repays the financial institution back the loans and the extra profit can be invested in new projects **(11-12)**. In time the farmer can repay the loan he took from SpiceUp **(13)**.

Flow of products and services, data and finance
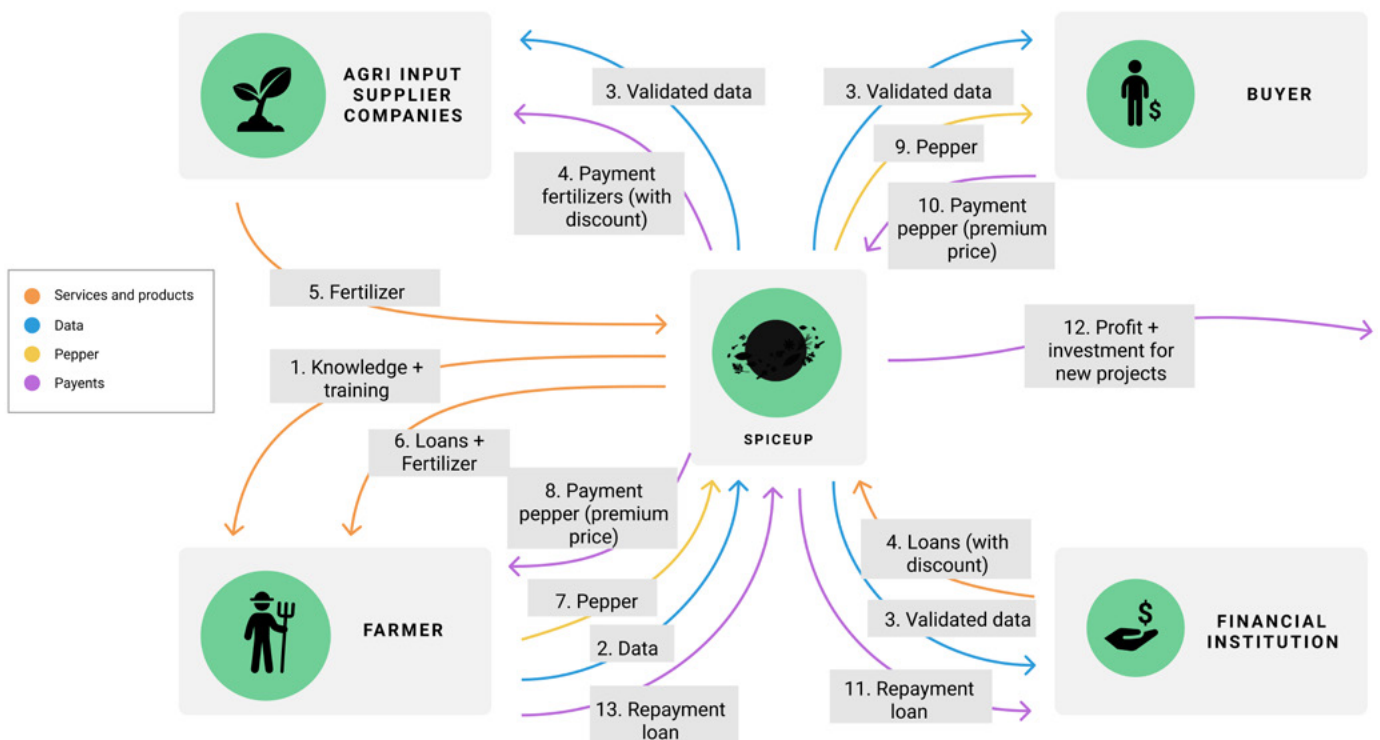
Reward system

As the farmers indicated, they do not currently track a lot of information about farm activities. Building off of the platform's proposed reward system, farmers can be rewarded with points for interactions made in the activity tracker. These points can be exchanged for discount vouchers.

Kebun Sahangku Calendar

The crop calendar is a printed calendar that is to be distributed by SpiceUp that farmers use to keep track of all activities on the farm. It consists of 'modules' that can be moved around based on alerts received via SMS/ WhatsApp. A farmer would engage with the calendar by noting ea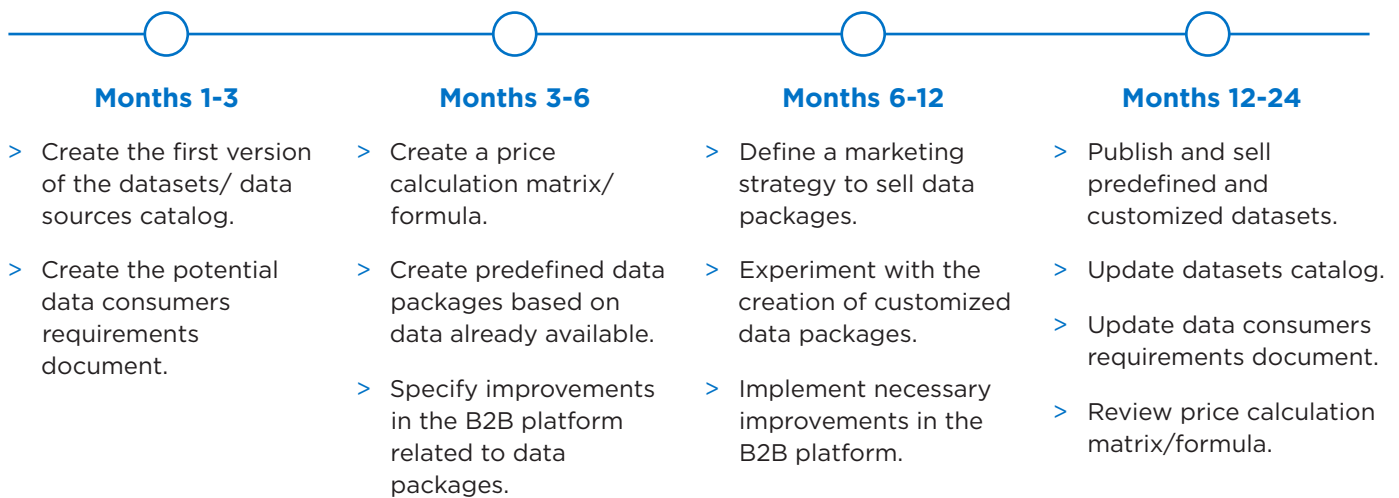ch time an action has been performed (e.g. fertilizer applied, or plants pruned, etc.) and would send a picture to SpiceUp via WhatsApp. Spiceup would parse the data using image recognition and automatically feed it into the farmer profile. Data entered this way will be periodically verified by SpiceUp/PT CAN during the delivery of supplies or tools.

Challenges still to be addressed

1 The data that is entered into the app by the farmer needs to be validated.

2 The reward system is now based primarily on discount vouchers. These must be exchangeable at shops where farmers are buying their inputs. Brands that are offering discounts on their products must to be available farmers' local shops.

Roadmap

Months 1-3

> Create the first version of the datasets/ data sources catalog.

> Create the potential data consumers requirements document.

Months 3-6

> Create a price calculation matrix/ formula.

> Create predefined data packages based on data already available.

> Specify improvements in the B2B platform related to data packages.

Months 6-12

> Define a marketing strategy to sell data packages.

> Experiment with the creation of customized data packages.

> Implement necessary improvements in the B2B platform.

Months 12-24

> Publish and sell predefined and customized datasets.

> Update datasets catalog.

> Update data consumers requirements document.

> Review price calculation matrix/formula.

Revenue model

What will be the costs?

> Feature development in app - **$20.000**

- QR code readability
- Sending alerts

> Developing the poster and printing copies - **$20.000**

- Develop capabilities to parse information from an image that a farmer sends through WhatsApp and upload the information on the server - **$5.000**

> Production of 20 videos - **$15.000**

> Hiring personnel to train and monitor - **$30.000**

> Server and maintenance - **$20.000**

> Cost of Pilot - **$20.000**

Total costs: **$130.000**

What will be our revenues at full scale?

> Share of fertilizer and pesticides farmers buy through app -

> Fertilizer: $10/farmer per year = **$1.000.000** for 100.000 farmers (Farmers spend an average of $200/year on fertilizer, roughly 5 percent of the sale.)

> Pesticide: $3/farmer per year = **$300.000** for 100.000 farmers (Farmers spend $120/year on pesticides.)

> Equipment rental - **$100.000**/year

> Insurance companies - **$50.000**/year (Half of the farmers pay $10/year.)

> Banking credit - **$25.000**/year

> Ads - **$30.000**/year

> Data subscriptions - **$50.000**/year

> Transaction fee of buying or selling pepper though app - **$200.000**/year

Expected revenue: **$1.8 million/year**

4.2.3 Defining the Indonesian Pepper Data Ecosystem

The IPDE is composed of several actors mainly interested in sharing and exchanging data to provide and consume customized services and products. These actors will generate value by tapping into different data resources like farmer profile, crop monitoring, weather and soil conditions data, which can be collected from several types of data sources, like mobile applications, sensors and satellites.

As part of the Launch Pad process, the main players of the Indonesian Pepper Data Ecosystem (IPDE) were mapped out and roles and responsibilities were identified. The IPDE follows a keystone-centric structure in which actors are organized around a keystone actor directly or indirectly responsible for providing much of the data.[1] It is important to note that the keystone actor does not have control over the other actors, but they should be a driving force behind the ecosystem and provide stability in unstable environments. In the case of this project, SpiceUp is the keystone actor in this Data Ecosystem

The other main actors identified include farmers, suppliers, insurance agencies, banks, collectors and buyers. Each actor has a set of capabilities and a set of expectations, i.e., a set of purposes or objectives related to the Data Ecosystem expected by the actor.

Each actor may play multiple roles in the IPDE. These roles, along with their corresponding activities, include (1.) the Data Publisher, who collects data, ensures data quality, creates, publishes and maintains datasets; (2.) the Data Consumer, who accesses, processes and analyses data, and provides feedback about data usage; (3.) the Data Provider who provides raw or aggregated data.

Based on our interviews with farmers and stakeholders, we were able to identify capabilities, expectations and roles for each of the main IPDE actors. These findings are illustrated in the table below.

Actor	Role	Capabilities	Expectations/Needs
Farmer	Data Provider	Provide data about farmer profile, farmer financial situation, crop monitoring, pests and diseases occurrences, adoption of GAP, pesticide usage and pepper sale price.	Receive support and recommendations to help dealing with pepper farming challenges.
Supplier	Data Provider/ Data Consumer	Provide statistics about price products.	Create customized offers.
Insurance Agency	Data Provider/ Data Consumer	Provide statistics about farmers' insurances.	Create customized insurance products.
Bank	Data Provider/ Data Consumer	Provide statistics about farmers' loans.	Create customized financial products.
Collector	Data Provider/ Data Consumer	Provide data about pepper traceability.	Create customized financial products
Buyer	Data Provider/ Data Consumer	Provide data about pepper traceability.	Define better pricing strategies.
SpiceUp	Data Collector/ Data Publisher/ Data Consumer	Collect farmers' data, weather and soil conditions data, pricing data and pepper traceability data. Publish raw and aggregated data about farmers, weather and soil conditions, pepper pricing and traceability.	Provide support and recommendations to farmers.

1. S. Oliveira, M.I., Barros Lima, G..F. & Farias Lóscio, B. Knowl Inf Syst (2019) 61: 589. https://doi.org/10.1007/s10115-018-1323-6

Capabilities, expectations and roles of the main actors of the Indonesian Pepper Data Ecosystem

Interactions or relationships among actors are based on common interests, agreements and business models. In the IPDE, the relationship between Farmer and SpiceUp includes the provision of data from Farmers to SpiceUp and the provision of recommendations and support from SpiceUp to Farmers. This relationship is a reward-based business model where farmers can earn points or credits. The reward is defined according to the farmer's engagement and could be redeemable with SpiceUp and/or other third parties, such as advertisers on the app. Additionally, SpiceUp must respect existing laws and agreements, such as data protection laws, when collecting and processing farmer's data.

4.2.4 Main legal considerations for data collection and learning platform

Before rolling out the SpiceUp app to all stakeholders, the organization needs to consider the legal and privacy rights of all stakeholders.

Company law: prior to launching the App, SpiceUp should ensure that it complies with all applicable requirements under Indonesian company law, such as any registration and license obligations and any requirements for the exploitation of an in-app webshop.

Data protection: personal data collection and processing in general and particularly data monetization, must be in line with applicable data protection laws. In this respect, SpiceUp should take into account the implementation of the Indonesian law on data protection. Draft legislation was published on 17 September 2019 and includes, among other rules, the obligations that:

> personal data must be obtained using legal and fair methods, and with the knowledge and explicit approval of the person concerned;

> processing is carried out in accordance with the intended use;

> personal data is protected by sufficient security measures;

> transfer of personal data outside of the Republic of Indonesia must be approved by the relevant individual;

> individuals may object to the processing of their personal data.

In this respect, SpiceUp should ensure that it informs all individuals prior to the processing of their personal data and obtains all required approvals for the intended use, including the transfer to any third parties outside of the Republic of Indonesia and the use of personal data for the purpose of data monetization. This can be done in the sign-up process of the App (e.g. 'tick the box') alongside acceptance of terms and conditions (see below) or at a later time. SpiceUp should be aware that the current draft of the data protection legislation requires approval to be clearly distinguished from other things, made in a format that is understandable and easily accessible and use simple and clear language. As a result, approval included in acceptance of terms and conditions is likely not sufficient.

Third party intellectual property rights: before using or selling any data (whether raw data or in aggregated form), SpiceUp should be aware of any third parties that may have ownership or other intellectual property rights relating to this data. For example, data purchased from satellite companies may be subject to acceptable use restrictions or exclusions.

Terms of use for the app *[please align with definition used throughout document]*: It is advisable to make the use of the App and related services is contingent upon acceptance of the terms and conditions that protect SpiceUp. In particular, SpiceUp should consider excluding liability for information provided through the App (e.g. weather data, recommendations in tutorials) insofar as possible under Indonesian law. In addition, terms of use should cover other functionalities of the App, such as a webshop.

Financial regulatory considerations: SpiceUp should consider that reward models that allow farmers to earn points or credits that are redeemable with SpiceUp and/or third parties for benefits may qualify as 'electronic money' (sometimes called 'e-money'). Issuance of e-money can be subject to license requirements, depending on whether the points or credits are redeemable for cash or other benefits, only with SpiceUp or (also) with third parties and the size of the model. SpiceUp is advised to seek specialized legal advice before implementing a specific reward model. For the avoidance of doubt, a model where farmers can earn points or credits that cannot be exchanged for benefits but do count towards calculation of the (premium) pepper price likely do not qualify as electronic money as the points cannot be redeemed.

Want to know more?

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